IHS > Decision Support Tool

PETRA®

User's Manual

April 12, 2011 – Version 2.0

The Source for Critical Information and Insight™

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PETRA User's Manual
April 12, 2011

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IHS Inc.
15 Inverness Way East
Englewood, Colorado 80112
303-736-3000

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1

Introduction

The application opens to the Welcome Topic and Introduction to PETRA®.

Welcome Topic

Introduction to PETRA®

Getting Started with PETRA to manage petroleum projects

Congratulations and thank you for selecting PETRA, the latest advance in PC software for the petroleum industry. PETRA impacts today's prospect generation and acquisition studies with tomorrow's technology. Its features are designed to enhance the decision-making process and strengthen your competitiveness. PETRA couples a powerful well database with easy-to-use mapping, cross section, and log analysis tools.

PETRA is designed for the Windows 2000/XP/Vista/Windows7 environment and is focused on improving the productivity of asset teams composed of geologists, geophysicists, petrophysicists, and reservoir engineers. PETRA provides a unique solution to data management, manipulation, visualization and integration of geological, geophysical, petrophysical and engineering data. Real-world proven functionality combined with the latest user interface technology allows easy transformation from raw well data to understanding critical reservoir parameters. Results can be quickly visualized using the interactive mapping, cross sections, log plots, cross-plots, and custom spreadsheets.

This manual contains a step-by-step tutorial intended to teach the first time user the basic skills for using PETRA. By reading this tutorial, you learn how to navigate the Main module to view and edit data, open the Map module to create various maps including contour maps, and to open the Cross Section module to correlate formation tops from a cross section display.

IHS Customer Care - PETRA

When you need **Technical Assistance,** please send an email to Petrasupport@ihs.com or call 1-800-IHS-CARE Ext 3 (1-800-447-2273, Ext 3).

When you need assistance with **Licensing,** please send an email to PetraLicensing@ihs.com.

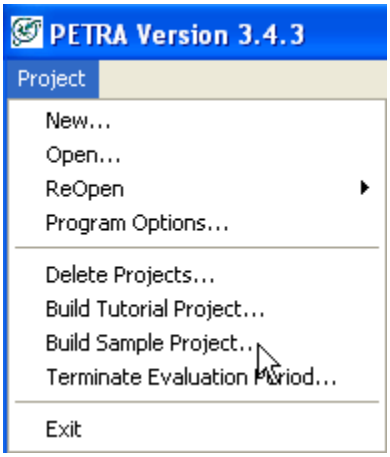
For all **Quote Requests,** send an email to PETRAQuoteRequest@ihs.com.

For all **Training Requests,** send an email to Petratraining@ihs.com.

Tutorial and Sample Projects

There are two projects available when you install PETRA. The projects are called Sample and Tutorial. The Sample project contains identical well data to the Tutorial project, plus additional data and computed results, such as grid files. It also contains specific default values to speed the viewing process. The Tutorial project is automatically extracted when you download and install PETRA using alldisks.exe.

To extract the Sample project, close the project that you have open, and click the **Project>Build Sample Project…** menu.



Note: If you do not have the Tutorial.zip and the Sample.zip at the root of the projects folder in the folder where you installed PETRA, you can download the files from the WEB. The links are:

https://petraftp.ihsenergy.com/Sample.zip

https://petraftp.ihsenergy.com/Tutorial.zip

The TUTPROJ.EXE located at the root of the projects subfolder can be deleted as it is no longer used.

This tutorial uses the Tutorial project database, which is installed along with the PETRA program files. The Tutorial project contains all data referenced by the tutorial manual. The Tutorial project is designed to be used in conjunction with this manual.

We encourage you to read this manual in its entirety. Doing so helps you gain an understanding of important concepts and capabilities that PETRA offers the geo-computing community.

Hardware Requirements

The minimum hardware required for operation is a personal computer system running:

- Microsoft Windows XP 32 bit OS or Vista/Windows 7 64 bit Operating System.
- Dual core processor or better.
- 4 GB RAM for XP 32 bit OS.
- 8 GB Ram for Vista 64 bit or Windows 7 64 bit OS.
- 512 MB Video system with OPENGL acceleration.
- Single 1,0124x768 VGA color monitor.
- If you are storing your projects on your local hard drive, obtain a drive that will hold at least 260GB or more of data. Remember to obtain a backup device of some kind in case of a failure. Backing up your data is critical.

Note: Use an external USB drive, which is probably the easiest to use. If it has not been formatted as NTFS, we highly recommend that the USB drive be re-formatted as a NTFS drive. There are tape back up devices, or a DVD writer can be used to backup projects if they are not over 4GB unless you use a backup software program that can span DVD's.

The recommended System Requirements

- Microsoft Windows Vista/Windows 7 64 bit Operating System.
- Quad core processor or better.
- 16 GB Ram for Vista/Windows 7 64 bit.
- 512 MB Video system with OPENGL acceleration.
- Dual Monitor System – video resolution of 1024x768 or better, and a color monitor. Dual or Triple monitors are not required but are supported if the operating system/video card(s) supports them.

Note: No special video cards are required. PETRA is compatible with a broad range of high performance video cards and dual and triple monitor installations.

- The standalone install requires about 117 MB of disk space for program files and the Tutorial project.
- The Network install requires about 188 MB of disk space for program files.
- The Network Client install requires about 12 MB of disk space for program files and the Tutorial project.

Software Installation

PETRA is available in both network and standalone versions on a CD-ROM or Internet download. When you receive a CD, please follow the specific instructions that are packaged with the software to insure proper installation.

Hardware Key

Apply the following hardware key information when installing PETRA.

Standalone

The stand-alone version of PETRA is shipped with a security hardware key called a *bitlock* or *dongle* that must be plugged into a USB or a parallel port. The security device must be on the PC before the program can be executed.

Network

The network version of PETRA is shipped with a security hardware key called a *bitlock* or *dongle* that must be plugged into a USB or a parallel port. A license manager must be installed on the same machine that the security device is attached to. The license manager and security device may be installed on a Windows 2000/2003 or 2008 server attached to your network. As an alternative solution, the license manager and security device can be installed on a workstation attached to the network. The license manager and security device must be installed before the program can be executed.

Another scheme for network licensing is FlexLM. This is the only license scheme that can be used if subscription licenses are to be used. The DATA Access and ESRI Arc Map Extension licenses are managed by FlexLM only.

If either of these license features are needed and you have a network bitlock, you will be required to convert to FlexLM, and the network bitlock must be returned to the Tulsa, Oklahoma office

after the conversion is completed via a registered means, like FedEx so that the package can be tracked.

We provide a FlexLM daemon for windows only.

Client workstations

The individual workstations have a Client version of PETRA installed.

Unlock code

The Evaluation version of PETRA uses a software unlock code to enable the software for a 30-day evaluation period.

Trouble shooting the hardware key

Trouble shoot installation problems with the following bitlock and bios settings information.

Bitlock No Longer Available

Note: If you pull the parallel or USB bitlock off the machine while PETRA is running or send a long print job to the printer attached to the LPT port that the parallel bitlock lock is attached to, you will obtain the following error message:

ERROR
Security Bitlock Key Is No Longer Available.
PETRA will now terminate after saving all data!
Friday, January 07, 2005 1:00:27 PM
OK

If you made any changes to an overlay layer, you must save your changes and close out of the Main and Map modules. Plug the bitlock back into the LPT port and/or wait until the long print job is finished before reopening PETRA. Another solution would be to exchange the parallel bitlock with a USB bitlock. Return the bitlock to the Tulsa office via a registered means, like FedEx so that the package can be tracked, and request a USB replacement bitlock.

BIOS Settings

As a general rule, the parallel port cannot be configured as an EPP port. Use either the ECP or Bi-Directional setting for the parallel port. These settings are called Mode setting parameters

under Parallel Port in the Integrated Devices section when in the BIOS setup configuration mode.

Refer to the documentation for your PC to verify and/or make changes to the BIOS configuration. The PETRA bitlock should not interfere with the performance of the printer port or any other bitlock currently installed. Simply plug the printer cable or any other device capable of connecting to the parallel port into the back of the bitlock.

File Naming Conventions

A filename can contain up to 215 characters, including spaces.

A filename cannot contain any of the following characters: \ / : * ? < > | (back slash, forward slash, colon, asterisk, question mark, quotation marks, less than, greater than).

Using a comma (,) or semi colon (;) may cause undesirable results. For instance, when using the Copy command to send a file to a printer connected directly to the LPT1 port that contains a comma, the resulting file length that is copied is zero bytes. The comma is used by the Copy command to indicate the omission of the *Destination* parameter.

Virus Scanning Software Considerations

We recommend that you turn off the virus automatic scan for the database files in the path for your projects. Scanning the files every time the file is read or written can cause performance issues.

The DBI database files with an extension of .BLB, .DAT, and .IDX project data files with an extension of Log Curves converted from a Table to files WSN*.BIN.

Some of the other data files that are created by PETRA and/or used by PETRA are listed below. Commercial data vendors create some of these file extensions when data is sent to our clients. This may not be a complete list of all file extensions that can be created for or read by PETRA.

Project Data Files:

.ALI, .API, .ASC, .ATT, .AVL, .BAK, .BAS, .BIN, .BMP, .BUB, .CAD, .CDF, .CFG, .CHR, .CLR, .CNT, .CON, .CPS., CPT, .CSP, .CSV., CTB, .CTX, .C98, .DAT, .DBF, .DBW, .DEF, .DLS, .DMP, .DOC, .DP2, .DPS, .DVP, .DXF, .DWG, .EMF, .ETX, .E00, .F10, .FM1, .FM2, .FM3, .FM4, .FM5, .FM6, .FM7, .FM8, .FM9, .FMT, .GES, .GFX, .GID, .GRD, .GCS, .HLP, .HS, .INI, .IPP, .JPG, .LA, .LAS, .LAY, .LIC, .LIM, .LIS, .LMA, .LOG, .LOS, .MAP, .MSG, .MID, .MIF, .MLP, .MOR, ,MPT, .MTB, .OVL, .ORD, .OUT, .OVP, .PET, .PID, .PAS, .PAT, .PDO, .PLT, .PMO, .PPF, .PRJ, .PRN, .PRO, .P12, .QRY, .QSG, .RAW, .REG, .RPT, .SBX, .SBN, .SEG, .SEI, .SHP, .SHT, .SHX, .SIF, .SLL, .SMT, .SRC, .SRV, .SSC, .SSS, .TIF, .TMC,

.TXT, .USR, .UWI, .VOL, .WCS, .WDI, .WDS, .WEL, .WMF, .WSN, .WSP, .WV2, .X, .XPP, .XPO, .XSO, .XSW, .XTP, .XYZ, .ZIL, .ZOL, .ZPL, .ZSC, .97C, .97F, .98C, .001, .002

Program Files:

config.exe, CopyProj.exe, DBI_ODBC.EXE, demo1.exe dbunzip.exe, dem2xyz.exe, FillContours.exe, FlexHostID.exe, geodemo.exe, geoplus1.exe, geostart.exe, gp3dviz.exe, gpbkgnd.exe, gpcorr.exe, gpgrid.exe, gphist.exe, gplogcor.exe, gplogtrn.exe, gpmap.exe, gppaplot.exe, gpseis.exe, gpspread.exe, gptmplot.exe, gpxplot.exe, gpxsect.exe, gpzplot.exe, haspusersetup.exe, hdd32.exe, Hinstall.exe, IHSLoader.exe, IHSProdLoader.exe, inifix.exe, Inst3dvis.EXE, Load298.exe, Machnm1.exe, MigrateToBDE.exe, Mo22rt.exe, Petra.exe, PetraBorrow.exe, PetraDBIMigrate.exe, PetraDBIRepair.exe, PetraDBM.exe, petradbserver.exe, PetraDBZip.exe, PetraPack.exe, PetraPriParmServer.exe, PetraProjectReport.exe, PetraScan.exe PetraRepair.exe, PriParmDBM.exe, PSMain.exe, PsTpLoad.exe, ptpetra90.exe, PXRest.exe, Qryhasp.exe, Qrylock.exe, RainbowSSD.exe, reghasp.exe, register.exe, regmemo.exe, regspro.exe, segyviewer.exe, UNWISE.EXE, *.dll files, *.wav files in the PetraSrv and/or geoplus1 folder. There are *.dll files located in the Parms folder in the install path as well.

Configuration File and Registry Entry

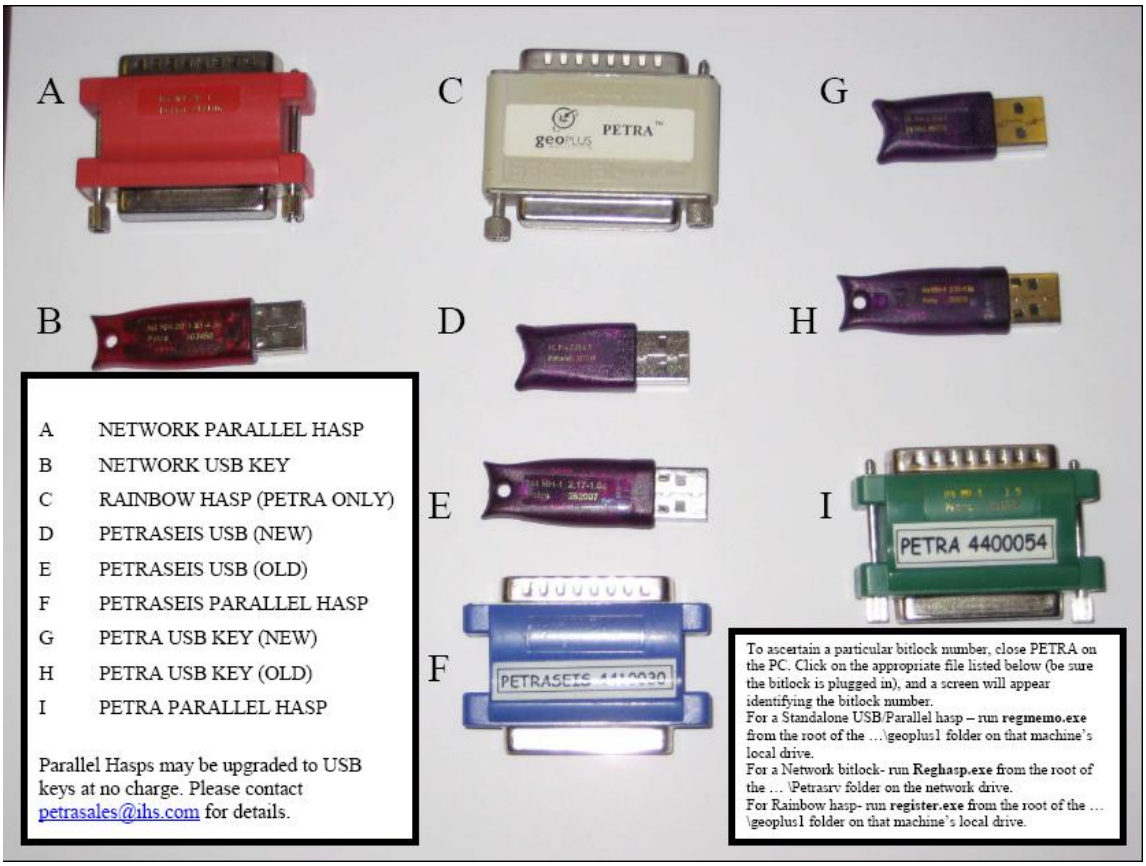
Regarding the PETRA configuration file, a file called GEOPLUS.INI is written to the root of the geoplus1 folder, which contains information that applies to the user.

PETRA writes to the Registry when installed. The location is

HKEY_LOCAL_MACHINE\SOFTWARE\geoPLUS Corporation

Installing HASP Memo Bitlock (Green Key or Blue Key for parallel keys or Purple for USB keys) Driver

Bitlock Descriptions


A
C
G
B
D
H
E
I
F
PETRA 4400054
A NETWORK PARALLEL HASP
B NETWORK USB KEY
C RAINBOW HASP (PETRA ONLY)
D PETRASEIS USB (NEW)
E PETRASEIS USB (OLD)
F PETRASEIS PARALLEL HASP
G PETRA USB KEY (NEW)
H PETRA USB KEY (OLD)
I PETRA PARALLEL HASP
Parallel Hasps may be upgraded to USB keys at no charge. Please contact petrasales@ihs.com for details.
To ascertain a particular bitlock number, close PETRA on the PC. Click on the appropriate file listed below (be sure the bitlock is plugged in), and a screen will appear identifying the bitlock number.
For a Standalone USB/Parallel hasp – run regmemo.exe from the root of the …\geoplus1 folder on that machine's local drive.
For a Network bitlock- run Reghasp.exe from the root of the … \Petrasrv folder on the network drive.
For Rainbow hasp- run register.exe from the root of the … \geoplus1 folder on that machine's local drive.

Windows operating systems require a device driver to be installed when using a HASP bitlock. The Hasp bitlock device driver installation program is normally located in the **C:\geoplus1\Drivers\Hasp folder**. There are several files in this folder.

Note: You must have administrative rights or the driver will not install.

Windows 7 has Native drivers that are installed when you plug in the USB bitlock. Normally, you do not have to install the HDD32.exe as a driver for the Aladdin USB Bitlock. You must have install privileges in order for the driver to be installed.

Using Windows Explorer, double-click the hdd32.exe file to install the driver for XP. The InstallShield procedure installs the Hasp device driver. Download from

https://petraftp.ihsenergy.com/hasp.zip. Unzip to the C:\geoplus1\Drivers\Hasp folder replacing the files if they exist. Double click on hdd32.exe and step through the Wise install wizard.

If the security device is a USB key, you should see a red light come on after the driver is installed.

Trouble Shooting conflicts with bitlock

Sometimes there is a conflict between the bitlock and the installed printer/plotter drivers. If you experience a time out when going to a device that is directly attached to the parallel bitlock, take the following steps:

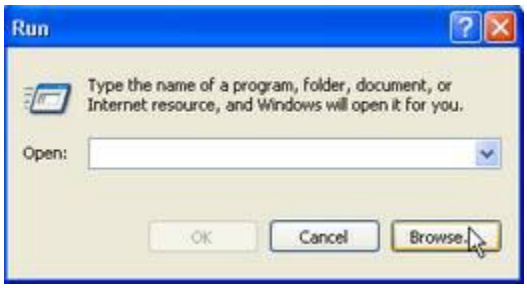
1. Remove the currently installed drivers by running from the Windows Start Run menu the program [drive letter]:\geoplus1\Drivers\Hasp\Hinstall.exe –remove with the switch as shown.

   Note: Replace [drive letter] with the drive letter where PETRA is installed.

2. Click **Start**

, and then click **Run…**

   A ***Run*** dialog box is displayed with an *Open* field.

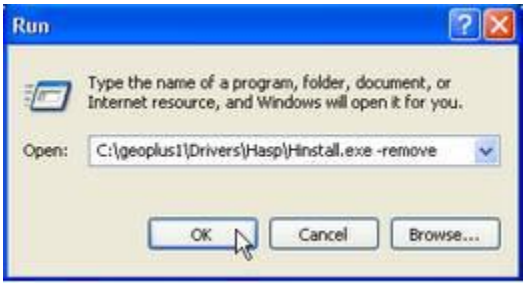


3. Enter **C:\geoplus1\Drivers\Hasp\Hinstall.exe or drive letter and path for the geoplus1 folder** into the *Open:* field (if you did not take the install defaults), and then click **Browse.**

4. Double-click the **HINSTALL.EXE** file. The full path to the file is entered into the Run command line.

5. Click to the right of the geoplus1\Drivers\Hasp\ HINSTALL.EXE path twice. The first time the path highlights in blue, the second time it highlights in white.

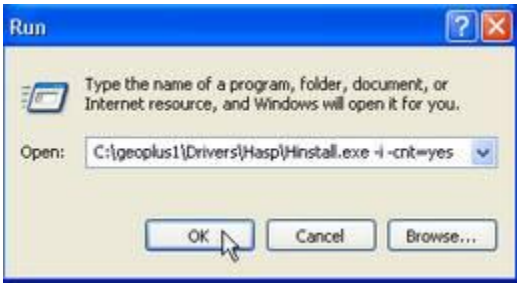
6. Enter the parameter -remove as shown.



Note: There are spaces between the parameters. Your path may not be C: if you did not take the defaults when installing PETRA. Click **OK**. A ***Hasp Device Driver install utility*** dialog screen is displayed with a Please Wait… message.

An Aladdin Device Driver Installation Utility for Win32 is displayed with the message The operation was completed successfully.

7. You must reboot your PC to completely remove the driver.
8. Install the Hasp driver by running from the Windows Start → Run menu. The path is still there from the previous entry.
9. Replace the **–remove** switch with the **–i –-cnt=yes** switches as shown below.



you see the same two dialog screens shown above with the "Please Wait…" and "The operation was completed successfully," messages.

Removing the HASP BITLOCK (Green Key or Blue Key for parallel keys or Purple for USB keys) Driver

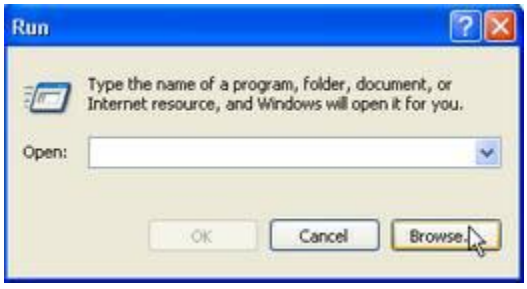
To remove the Hasp bitlock driver take the following steps:

1. Remove the currently installed drivers. This is accomplished by running from the Windows Start Run menu the program [drive letter]:\geoplus1\Drivers\Hasp\Hinstall.exe –remove with the switch as shown.

   Note: Replace [drive letter] with the drive letter where PETRA is installed.

2. Click the **Start** button

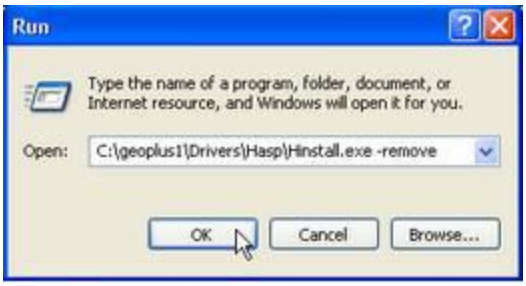
, and then click the **Run** option.



3. Click **Browse** on the ***Run*** dialog screen.
4. Navigate to **C:\geoplus1\Drivers\Hasp\Hinstall.exe or drive letter and path for the geoplus1 folder** if you did not take the install defaults.
5. Double-click the **HINSTALL.EXE** file.

   The full path to the file is entered into the *Run* command line.

6. Click to the right of the geoplus1\Drivers\Hasp\ HINSTALL.EXE path twice. The first time the path is highlighted in blue, the second time it is highlighted in white. Enter the parameter **-remove** as shown.



Note: There are spaces between the parameters. Your path may not be C: if you did not take the defaults when installing PETRA. Click **OK**. A ***Hasp Device Driver install utility*** dialog screen is displayed with a Please Wait… message.

An **Aladdin Device Driver Installation Utility for Win32** is displayed with a message The operation was completed successfully.

7. You must Reboot your PC to completely remove the driver.

Removing the RAINBOW BITLOCK (Beige Key) Driver

Note: The Rainbow bitlocks are being retired and will no longer be issued to clients. Memo Hasp Parallel or USB keys will be issued instead. The rainbow bitlock can be returned to the Tulsa office, via a registered means, like FedEx so that the package can be tracked, for a free replacement of the Rainbow Bitlock with a Memo Hasp USB bitlock.

To remove the Windows 2000/XP/Vista/Windows7 bitlock driver,

Run, [drive letter]:\geoplus1\Drivers\Rainbow

1. In Explorer, locate the geoplus1\Drivers\Rainbow folder and double-click the **RainbowSSD.exe** file. (Replace **[drive letter]** with the drive letter containing the Geoplus 1 directory and program files. Normally this is **C**.).

   A Sentinel System Driver – ***InstallShield Wizard*** dialog screen is displayed.

2. Click **Next** to continue.
3. Click the **Remove** radio button, and then click **Next**.
4. Click **Remove**.

5. Click **Finish**.

   The next time you reboot your PC, the driver is completely removed at that time.

Updating Bitlock

Updates for bitlocks occur as follows:

Standalone Bitlock

Fifteen days prior to the expiration of your annual maintenance, IHS sends you a registration code to be used to update your bitlock

Memo Hasp - Parallel Key (Green and Blue) & Purple USB Key

If you have a current version of PETRA, there is no need to download the utility as it is included when installing the latest version of PETRA.

You can download the latest version of the PETRA utility that is used to update the bitlock, from https://petraftp.ihsenergy.com/regmemo.zip. After the file has been downloaded into the Geoplus1 folder, unzip the file to replace the existing regmemo.exe file.

1. Double-click the **regmemo.exe** file. The ***Register PETRA License*** dialog screen is displayed.
2. Enter the code supplied by IHS into the *Enter Registration Code* data field.
3. Click the **Register** button.

   The bitlock updates, and the new **Current Expiration Date** is displayed.
4. Select the appropriate bitlock Key Type in the Select Key Type section of the dialog screen.

5. Click the appropriate Radio button to the left of the key that you want to update.

Network Bitlock - Memo Hasp - Red Key (Parallel or USB)

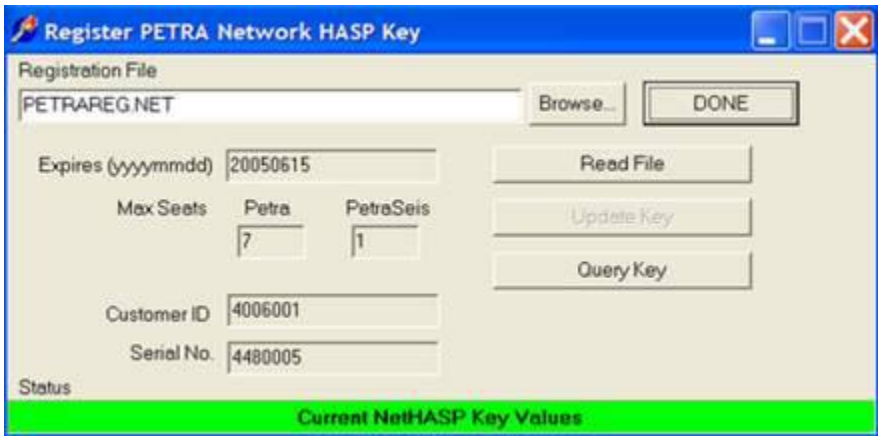
Fifteen days prior to the expiration of your annual maintenance, IHS sends you a petrareg.net data file. Save this file at the root of the folder where PETRA was installed. The folder defaults to Petrasrv.

When your annual maintenance is paid, IHS sends you a code to update your network bitlock.

If you have a current version of PETRA, there is no need to download the utility as it is included when installing the latest version of PETRA.

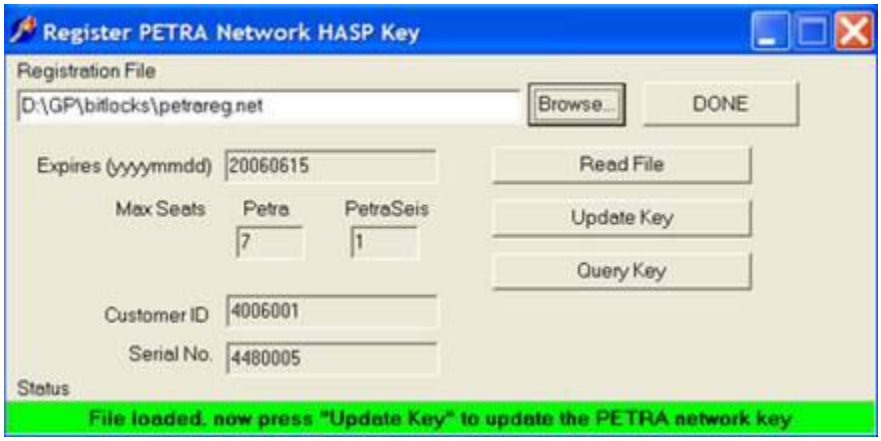
You can download the latest version of the PETRA utility that is used to update the bitlock, from https://petraftp.ihsenergy.com/reghasp.exe .into the Petrasrv folder replacing the existing reghasp.exe file.

1. Double-click the **reghasp.exe** file. The ***Register PETRA Network HASP Key*** dialog screen is displayed with the current key values.

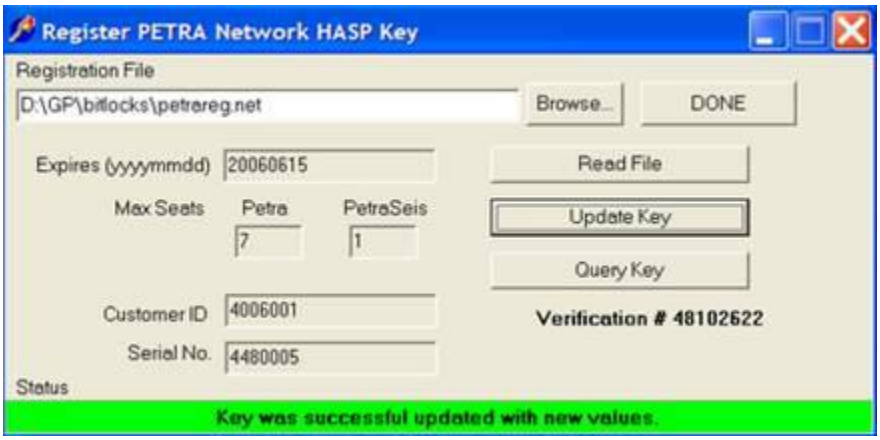


2. Click the **Browse…** button to navigate to the PETRAREG.NET file. The file should have been saved to the root of the Petrasrv folder.

3. Click the **Read File** button and follow the instructions at the bottom of the dialog screen. Click the **Update Key** button to update the PETRA network key.



The message at the bottom of the dialog screen displays Key was successfully updated with new values.



4. Stop and start the Hasp Loader service to pick up the new values that were programmed into the bitlock.

FlexLM

Fifteen days prior to the expiration of your annual maintenance, IHS sends you a geoplus.lic data file to save to the root of the folder where PETRA FlexLM was installed. The folder defaults to Program Files\IHS\PetraFlex# where # is either 32 or 64 depending on whether the installation is on a 32 bit or 64 bit sever when you step through the install procedure. The geoplus.exe daemon is in this same folder. Stop the established service, the default service name is "PETRA License Manager," and start the service. Everyone must be out of PETRA when the service is stopped and re-started.

Quick Overview

The SAMPLE project contains computed grid files, specific default values, and displays prepared for a quick overview of PETRA.

We strongly recommend that you review the tutorial material prior to venturing off on your own. **Familiarize yourself with the Data Organization and Concepts section.**

When first running PETRA, you have a ***Welcome to PETRA*** dialog screen displayed. There are three choices displayed:

- ReOpen your Last Project
- Open an EXISTING Project
- Create a NEW Project

The Sample project is not automatically generated.

The SAMPLE project can be created by following the steps that are outlined below:

1. Close the TUTORIAL project by clicking the **Close the Current Project** icon , or **Project → Close Project** menu.
2. Click the **Project → Build Sample Project...** menu.
3. Click the **Project → Open...** menu.
4. Select **SAMPLE** from the list of projects displayed.

   There are three icons in the upper left portion of the Main screen. The first icon is Create New Project, the middle icon is Open An Existing Project and the third icon is Close The Current Project.

The following topic list gives you suggestions for topics to preview during your overview.

- Look at the Formation Tops tab in the main module and see how easily tops can be modified.
- View the Zones tab to see how PETRA can maintain user-defined variables.
- Check the digital log curve-previewing feature located on the Logs tab of the main module.
- Look at the monthly production charts by selecting the Production tab on the main module and scrolling through several wells.
- Learn how to start the Mapping module from the main tool menu and use the Options → Active/Inactive… menu to turn on and off some of the predefined displays.

- Learn how to start up the Cross-section module from the Mapping module by using the Cross Section → Switch To Cross Section Tool.
- Change the digital log curve shading in the Cross section module using the Logs → Display Options menu.
- Change the tops drawing options in the Cross section module using the Tops → Display Options menu.
- Start the Log Cross Plot module from the Main module menu.
- Try both XY and ternary cross-plot displays

2

PETRA Tutorial Overview

Overview

This tutorial is designed to familiarize you with data organization, fundamental design concepts and tools that allow you to manage your geological projects more efficiently and make more effective use of your time.

PETRA can reduce the time spent editing and cleaning up data and increase time available for data analysis and interpretation.

This tutorial teaches you how to

- Determine which tool to use to accomplish a particular task
- Navigate the main module to view and modify well data
- Define zones for organizing data by geologic interval
- How to preview digital well log curves
- Create base maps with posted data
- Generate structure contour maps
- Compute and display isopach contour maps
- Compute and display cumulative production using bubble maps
- Add and modify overlay lines and text
- Create cross section displays using digital logs and/or scanned raster images
- Correlate formation tops from a cross section
- Create a new project, import well, and digital log data.

Function Keys

There are many function keys and keyboard shortcuts to speed the workflow.

Download or view the PETRA shortcuts by clicking the following link or entering it into your internet browser:

https://petraftp.ihsenergy.com/petra_function_keys.pdf

Function Keys – Main

Project>Import>General Well Data From…Generic ASCII File…	Ctrl+T
Project>IHS Enerdeq>Import Wells From Enerdeq Direct Connect…	Ctrl+Alt+W
Project>IHS Enerdeq>Import Production From Enerdeq Direct Connect…	Ctrl+Alt+P
Project>IHS Enerdeq>View Enerdeq Scout Ticket For Current Well…	Ctrl+Alt+S
Project>Settings>Program Options…	Ctrl+O
Wells>Select>All Wells	Ctrl+A
Wells>Select>Current Well Only…	Ctrl+W
Wells>Select>Wells By Data Criteria	Ctrl+S
Wells>Go To Well…	Ctrl+G
Wells>Use Previous Well List	Ctrl+P
Units>View As Imperial	F1
Units View As Metric	F2
Close PETRA	Alt+F4
Find Text In Well List	Ctrl+F
Go To Well In Map	F8

FmTops Tab – Right Click popup menu

Lock Item for This Well…	Ctrl+L
Unlock Item for This Well…	Ctrl+U
Lock Item for Selected Wells…	Alt+L
Unlock Item for Selected Wells…	Alt+U

Zone Tab – Right Click popup menu

Lock Item for This Well…	Ctrl+L

Unlock Item for This Well…	Ctrl+U
Lock Item for Selected Wells…	Alt+L
Unlock Item for Selected Wells…	Alt+U

Function Keys – Spread Sheet

Wells>Select>All Wells	Ctrl+A
Wells>Select>Wells By Data Criteria	Ctrl+S
Search>Find and Replace	Ctrl+F

Function Keys – Raster Calibration

Depths>Display Depths As Feet	F1
Depths>Display Depths As Meters	F2
Depths>Go To Depth	Ctrl+G
Digitizing - select segment -Breaking into two segments	Ctrl
Digitizing – select segment -Breaking and Deleting Part of a Segment	Ctrl and Alt
Digitizing – Merge segments - select segment	F5
Tops>Edit Mode Active	Ctrl+T

Function Keys – Raster Log Correlation

Image>Open Image…	Ctrl+O
Image>Exit	Ctrl+X
View>Alignment Cursor	Ctrl+A
Depths>Line Up At Depth…	Ctrl+D
Depths>Depth Scale…	Ctrl+S
Depths>Go To First Depth…	Ctrl+F

Function Keys – Log Correlation

Select Previous Top (In Top Pick List)	F5
Select Next Top (In Top Pick List)	F6
Flatten On Selected Top (Top Must Be Selected)	F7

Show Top On Mouse Hover	F8
Show Depth By Mouse	F9
Pan (When In Zoom Mode)	Arrow(s)
Vertical Scroll (When In Zoom Mode)	Mouse Wheel
Assign Logs For Log Type In Left Column (Only If Log Type Is Defined For Column)	Ctl+L
Assign Logs For Log Type In Center Column (Only If Log Type Is Defined For Column)	Ctl+C
Assign Logs For Log Type In Right Column (Only If Log Type Is Defined For Column)	Ctl+R
Undo Last Top Pick	Ctl+Z
Highlight Top (In Display List) Closest To Mouse	Ctl+Left Mouse
Pan View (When In Zoom Mode)	Alt+Left Mouse
Slide Well Up/Down	Shift+Left Mouse
Reset Well Depths	Shift+F7

Function Keys – Map

File>Load Map Settings…	Alt+L
File>Print Preview (Old)	Shift+Ctrl+Alt+F12
File>Save Map Settings…	Alt+S
Wells>Select Wells>All Wells	Ctrl+A
Wells>Select Wells>Wells By Data Criteria…	Ctrl+S
Wells>Use Previous Well List	Ctrl+P
Wells>Edit>Add New Well with Mouse…	Alt+A
Overlay Snap to intersecting lines	F2
Overlay Snap to intersecting lines of a Quarter Section Grid	F3
Overlay>Edit>Select Item	Ctrl+E
Overlay>Edit>Auto Set Polygon	Ctrl+1
Overlay>Edit>Set Auto Set Polygon Attributes…	Ctrl+2
Overlay>Find Text Item…	Ctrl+F
Overlay - Multiple lines or single text items selection for modification	Shift+Ctrl+LftMseBtn
Overlay>Line Stream Mode Active	Ctrl+Alt+S

Overlay>Save Files(s)>Save Multiple Layer Files…	Ctrl+Alt+L
Tools>Measure Distance	Ctrl+D
Tools>Quarter Section Grid>Auto Pick Section…	Ctrl+Q
Tools>Quarter Section Grid>Hide	Alt+Q
Tools>Digitize Seismic Line…	Shift+S
CrossSection>Move Line Node Projections	Ctrl+N
Display>Redraw	Ctrl+R
Display>Refresh Data	Alt+F
Display>Map Scale>Use Exact Screen Scaling	Ctrl+F9
Display>Data Limits>Use Overlay Extents	Ctrl+O
Display>Auto Scale & Limits	Ctrl+L
Display>Zoom In	Ctrl+Z
While Zoomed in, press the + - keys to zoom in and by ¼ of the zoomed extents	
Display>Zoom Off	Alt+Z
Display Lat/Long, X/Y values on the screen – Toggle Key	F9
Display>Pan	F10
Window>Toggle Window Clipping	Ctrl+W

Function Keys – CrossSection

Wells>Add a Pseudo Well…	F4
Logs>Interpretative Color Fill>Refresh Grid	Ctrl+F
Logs>Pay Intervals…	Ctrl+P
Display>PetraSeis>Arbitrary Line In PetraSeis	F6
Display>PetraSeis>Create and Show Arbitrary Line Overlay	F5
Display>PetraSeis>Show PetraSeis Arb Line Overlay	Shift+F5
Display>Zoom In	Ctrl+Z
Display>Measure Tool	Alt+M
File>Save>Cross Section	Ctrl+S
File>Load>Cross Section	Ctrl+L
Scales>Well Header Display Tool	Ctrl+W

Function Keys – Log CrossPlot

Wells>Select>All Wells	Alt+A
Wells>Select >By Data Criteria…	Alt+S
Wells>Select>Cross-Section Wells	Alt+C
Wells>Select>Well From Main	Alt+W

Function Keys – Histogram

Wells>Select>All Wells	Alt+A
Wells>Select >By Data Criteria…	Alt+S
Wells>Select>Cross-Section Wells	Alt+C
Wells>Select>Single Well From Main	Alt+W

Function Keys – 2D Seismic

Options>Set Active Lines…	Ctrl+A
Zdata>Spread Sheet…	Ctrl+S
Columns>Interpolate Missing Values (Current Column)…	Ctrl+I
Columns>Interpolate Missing Values (All Columns)…	Alt+I
Columns>Interpolate Current Cell Only	F1

Function Keys – Slip Logs

File>Exit	Ctrl+X
View>Alignment Cursor	Ctrl+A
View>Fit All	Ctrl+F
Depths>Line Up At Depth…	Ctrl+D
Depths>Depth Scale…	Ctrl+S
Depths>Go To First Depth	Ctrl+F
Depths>Apply Fault Gaps	Ctrl+G

Function Keys – Log Curve Previewer

Logs>Set Scale	Ctrl+S

Logs>Restore Original Log	Ctrl+O

Function Keys – 3DViz

The 3D scene is moved and adjusted using the left mouse button to drag a point in the screen causing the scene to shift and rotate.

The right mouse button is used to zoom in and out by dragging a point up to zoom in and down to zoom out.

The scene may be rotated by holding down the Ctrl key and dragging a point with the left mouse button.

Pan is accomplished by using the middle mouse button or by using the Shift key and left click dragging.

Mouse control – 3DViz

Double-click a well to select well in Main.

Rotate and move scene	Left Click and Drag
Zoom In	Right Click and Drag Up
Zoom Out	Right Click and Drag Dn
Rotate Scene	Ctrl + Left Click and Drag
Pan Scene	Shift + Left Click and Drag
Pan Scene	Middle Click and Drag

The following 3DViz keyboard shortcuts are available:

Restore Cube Horizontally	F4
Refresh Data From Tables	F5
Restore Default View	F6
Axis Options	Ctrl + X
Extent Options	Ctrl + E
Frame Options	Ctrl + F
Display Options	Ctrl + O
Clear All	Ctrl + C
Display All	Ctrl + D
Set Light Position	Ctrl + L

Set Data Limits to Full Extent	Ctrl + W
Zoom In	+
Zoom Out	-
Zoom Off	Z
Rotate the scene in the selected direction	Ctrl + ←→↓↑
Pan the scene in the selected direction	Shift + ←→↓↑

The following hot keys may be used for 3DViz display options

Show as wireframe	W
Show as solid	S

Double-click the layer item to change the properties of that layer, uncheck the layer to hide it, and select the layer and click the remove button to remove the layer from the list.

Function Keys – Directional Well Module

General

Pan View	Middle Click and Drag
Re-Draw Screen	F5
Refresh Data	Shift + F5
Select All Wells	Ctrl + A
Select Wells by Data Criteria	Ctrl + S
Open Help	F1

Profile View

Print	Ctrl + P
Auto-Set Depths to Fit Well	F3
Fit Depths to Screen	F4

Top Picking Mode

Pick FM Top on the Well-Bore	Left Click
Pick FM Top Above/Below the Well-Bore	Shift + Left Click
Move FM Top Pick	Left Click and Drag
Delete FM Top Pick	Alt + Left Click

Events (while NOT in edit mode)

Move Event Text Box	Shift + Left Click
Open Event Edit Dialog	Shift + Double Left click

Events (while in edit mode)

Move Event Text Box	Left Click + Drag
Open Event Edit Dialog	Double Left click
Move Event Depth	Left Click + Drag

Correlate Window

Scale Section of Log (stretch/squeeze) Up/Down	Ctrl + Left Click + Drag
Slide Log Up/Down Drag Up/Down	Shift + Left Click +
'Slip' Log Within Scale Region	Middle Click + Drag Up Down
Add Scaling Point to Log	Double Left Click
Delete Scaling Point	Alt Left Click

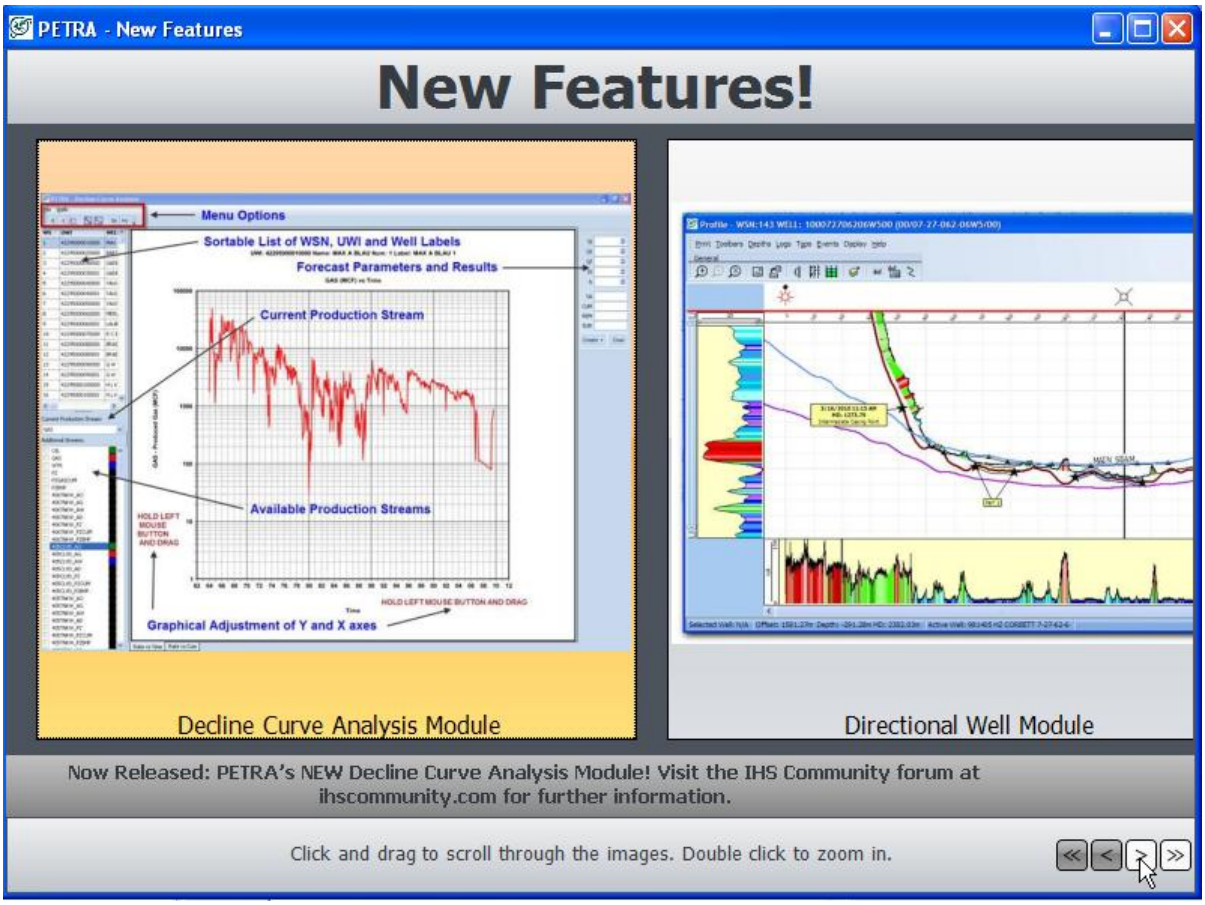
PETRA Modules and Tools

The PETRA program is composed of a Main module and several specialized **tool** modules. The Main module provides most of the well data viewing, editing functions, and calculation options. Main also launches the tool modules and coordinates inter-task communication between the tools.

Main Module

The Main module provides the basis for all functions in PETRA. Projects are created, opened and closed from Main. Main provides screens for viewing and modifying all well data, including header information, formation tops, user defined z data, and production data. Main provides many data calculation functions, including isopach, footage summations from log data, production cumulative values, and user-defined equation evaluations. The PETRA Main module screen is organized into a list of wells on the left and a series of tabs on the right. Each tabbed section displays details, of a specific data type, for the well highlighted in the well list.

The first time you open PETRA after an update to a new version or after installing a patch for the latest version, you see a new splash screen.

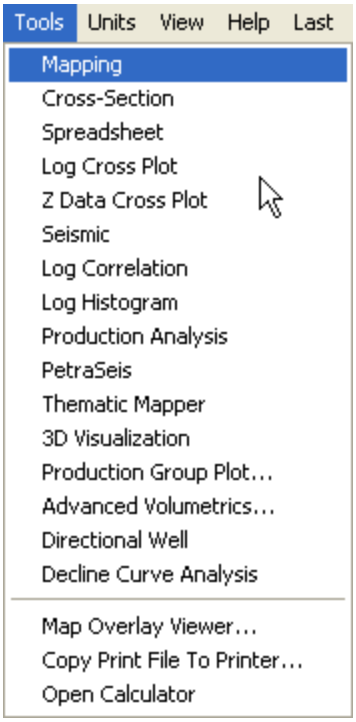

PETRA - New Features
New Features!
Menu Options
Sortable List of WSN, UWI and Well Labels
Forecast Parameters and Results
Current Production Stream
Available Production Streams
Graphical Adjustment of Y and X axes
Decline Curve Analysis Module
Directional Well Module
Now Released: PETRA's NEW Decline Curve Analysis Module! Visit the IHS Community forum at ihscommunity.com for further information.
Click and drag to scroll through the images. Double click to zoom in.

Click the red **X** in the upper right corner to close the splash screen.

Click the **View More Info** button to view a New Features.page with the latest enhancements and bug fixes. The New Features page only shows the changes to the new version.

You can display this splash screen at any time by clicking the menu **Help>New Features Splash**. Click the appropriate button for viewing or closing the splash screen.

In the Main module, there is a drop-down menu called Tools. You can open the various modules that are available using this menu.



Shown below are the icons that can be used to open most of the modules in PETRA as well as icons for navigating through the wells, refreshing data in the tables, and highlighting a well on the map.

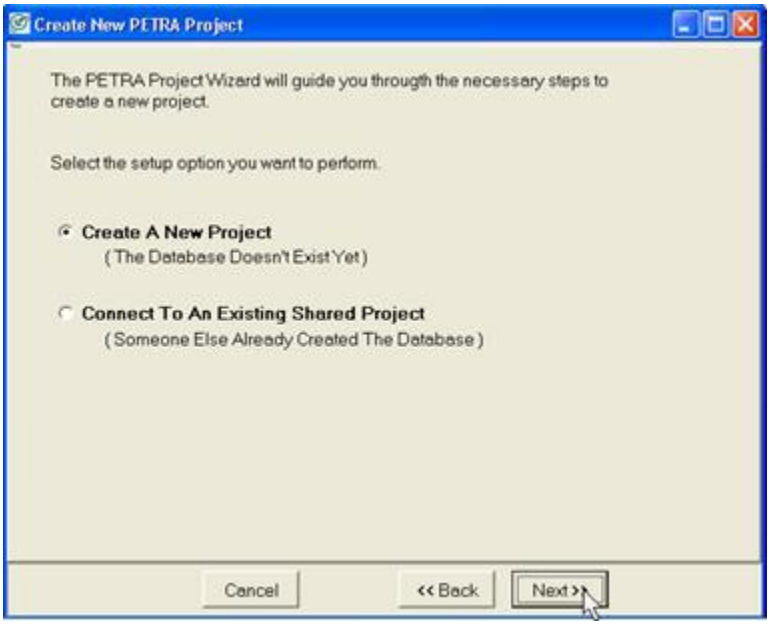
The Icons above, left to right, are Create New Project, Open An Existing Project, Close the Current Project, Select Wells By Data Criteria, View/Edit Zone Data, Mapping, Cross Section, Spread Sheet, Log Cross Plot, Z Cross Plot, Histogram, Mo Production Analysis, Group Production Plot, 2D Seismic, PetraSeis 2D-3D Interp, Thematic Mapper, 3d Visualizer, Slip Logs Module, Log Correlation Module,

Current selected well, tab that is selected (in this case Project); icons are: Highlight Well On Map (F8), (This option will not work if the Map module is not open), Refresh Data From Disk, Display Previous Well In List, Display Next Well In List, Help, and Close and Exit..

Note: The PetraSeis 2D-3D Interp icon is not shown until that module has been installed.

Click the **Create New Project** icon to start the Create New Project Wizard. You are guided through the necessary steps to create a new project or to connect to an existing shared project.

The following dialog screen is displayed:

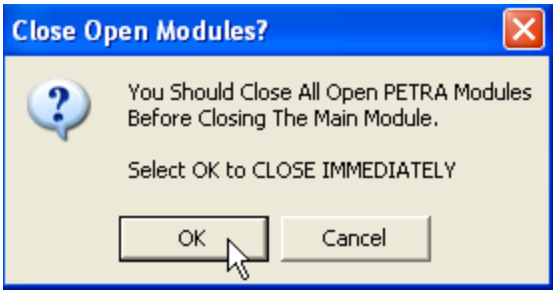

Create New PETRA Project
The PETRA Project Wizard will guide you through the necessary steps to create a new project.
Select the setup option you want to perform.
Create A New Project
(The Database Doesn't Exist Yet)
Connect To An Existing Shared Project
(Someone Else Already Created The Database)
Cancel
<< Back
Next >>

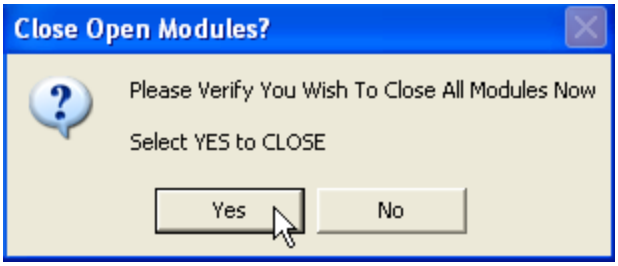
Click the **Open An Existing Project** icon to display a list of projects that are available from the local Parms path. The local Parms path is the path on the local PC where PETRA was installed, typically, C:\geoplus1\parms.

Click the **Close The Current Project** icon to close the current project in preparation to close PETRA, Create New Project, or Open An Existing Project.

Note: Close any open module before closing the current project, which allows you the opportunity to save your Overlay data in the Map and CrossSection modules if you have made any changes. If there are any open modules when you click the Close The Current Project icon, a ***Close Open Modules*** dialog screen is displayed.

You can click **Cancel** and close each open module, or you can click **OK** to let PETRA close the open modules along with the associated tables. If you click **OK,** a ***Close Open Modules?*** dialog screen is displayed.

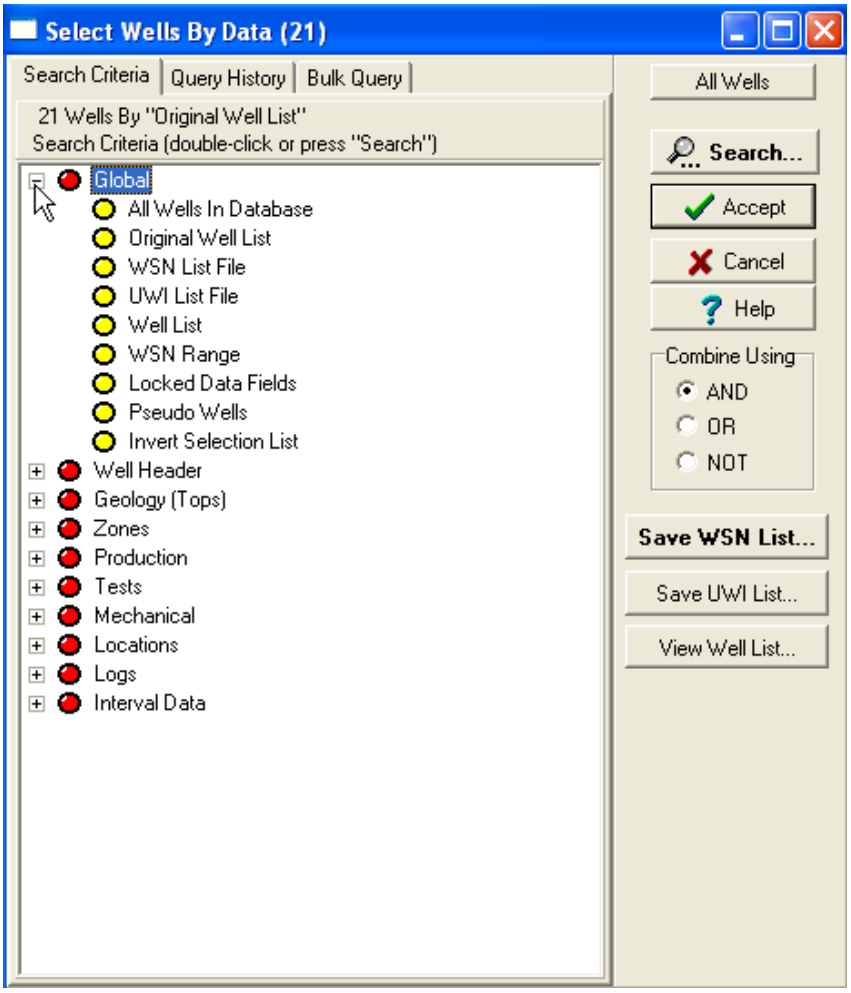

Close Open Modules?
You Should Close All Open PETRA Modules Before Closing The Main Module.
Select OK to CLOSE IMMEDIATELY
OK
Cancel



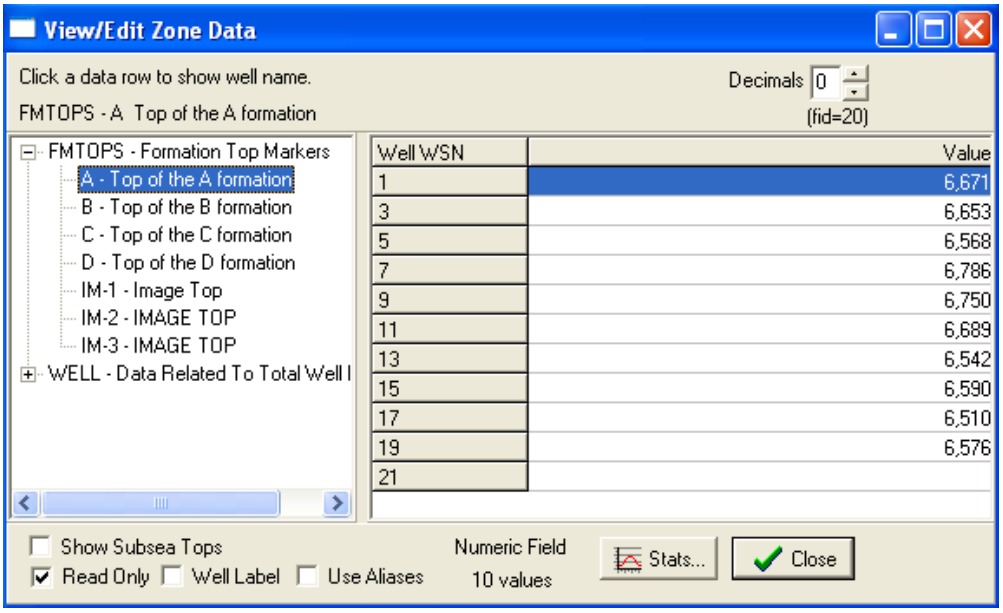
If you've made a change to an overlay layer, you must either save the overlay file or dismiss the save of the overlay file.

Note: The save overlay screen may be behind the dialog screen that is displayed after closing Main. Iconize the screen to check it.

Click **Select Wells By Data** icon to display the ***Select Wells By Data*** dialog screen as shown below. You can select a set of wells based on the Search Criteria that you select. Click the plus + to the left of the major category to expand the selection criteria.



Click the **View/Edit Zone Data** icon to bring up the ***View/Edit Zone Data*** dialog screen. You can select data from the FMTOPS or WELL zone to view and edit. The FMTOPS A formation is shown below.



Mapping Tool

The Mapping tool provides PETRA mapping functions, including base maps, contour maps, bubble maps, and attribute maps. Maps provide a direct link to the well database by double-clicking on a well. Maps also provide many data editing functions, including modifying or spotting well locations from footage calls, importing and modifying land grids, and capturing and modifying contours. The Mapping tool also functions to define the wells for a cross section display.

Cross-Section Tool

The Cross-Section tool displays profiles across the project area and can include deviated bore holes, well logs, formation tops, faults, posted well information, cored, perforated and tested interval indicators, and overlays of user-drawn interpretations. The Cross-Section tool offers many data editing functions, including interactive correlation of formation tops, digital log data editing and depth shifting, and picking high-low cutoffs used for log normalization. In addition to digital logs, depth calibrated raster images can be displayed on the cross section.

The cross section can be displayed as a structural or a stratigraphic section.

Production Charts and Attribute symbols can also be displayed.

Spread Sheet Tool

The Spread Sheet tool provides a quick way to view and edit selected columns of data for a few wells or for all wells in the project. Each data column is chosen from the well header items, formation tops, and Zone data items. Tops can be edited as measured or subsea TVD. The Spread Sheet tool provides "a find and replace function" for making global changes.

A CSV file can be exported from the Spread Sheet tool with options to include the column headings and to include the WSN column.

Log Cross Plot Tool

Log cross plots are traditionally used by petrophysicists to analyze relationships between digital log curves and to develop models for log transformations. PETRA can generate XY, XYZ, and ternary cross plots for a single well or multiple wells combined. Additional discriminator log curves can be specified to filter the data. Standard graphs and charts (digital or scanned) can be overlain on the cross plot to differentiate lithologies. Polygons can be digitized onto the cross plot and utilized in advanced log transformations to develop facies log curves.

Z Cross Plot Tool

The Z Cross Plot tool is similar in functionality to the log cross plot tool except tops and zone data (numeric and dates) are cross-plotted to generate XY and XYZ plots.

2D Seismic Tool

The 2D Seismic tool offers the user the ability to import 2D and 3D seismic locations and horizon z data. Line names and shot point numbers can be edited. Shot point Z data is presented in tabular format and can be viewed and edited on a shot point or line basis.

Note: This tool does NOT display 2D SegY or 2D Rasters.

Log Histogram Tool

The Log Histogram tool displays both a statistical histogram and a vertical log curve representation of a selected log curve, and allows the user to visually pick values such as high

and low picks, that can be used elsewhere in PETRA. These picks are typically used for digital log curve normalization.

Production Analysis Tool

The Production Analysis tool provides monthly production data for cross-plotting and decline curve analysis functions. Parameters, such as projected reserve estimates, can be computed by graphically fitting exponential or hyperbolic functions to decline curves and capturing and storing related parameters in the database for mapping, computations, (drainage areas), and other purposes.

Production Group Plot Tool

The Production Group Normalization Tool displays and analyzes monthly production data for a set of wells. With this tool, production data can be easily summed together, averaged, or time-normalized back to a single starting date and used to derive ratio curves (water to oil, gas to oil, watercut, etc.). This is useful for comparing historical and average production between different populations of wells. For example, this tool can be used to compare production differences based on completion techniques, reservoir properties, or structural setting.

PetraSeis Tool

The PetraSeis tool is sold separately and is designed to be ***tightly*** integrated with PETRA. Therefore, it is launched from the Main module of PETRA, similar to the other PETRA modules. Typically a project requiring interpretation of 2D seismic lines and 3D seismic volumes have associated well and land grid data, and IHS recommends the project map projection and well header data be loaded prior to loading the seismic data. Following this sequence eases the work flow and minimizes confusion. For details on loading well, log curves, and cartographic data into PETRA, please refer to the appropriate sections in this Manual. Included with your PetraSeis license is a sample project dataset, called the SoonerDemo Project. All of the necessary files are installed in PETRA and PetraSeis to allow you to practice interpretation of the data.

Thematic Mapper

PETRA's Thematic Mapping module is designed to import, display, query and color ESRI Shape Files based on its attribute data and send the results to the Mapping module's overlay layer.

The primary functions of the Thematic Mapper are

- Read in a shape file as a theme with associated attributes
- Create new shape files resulting from expression, spatial or distance queries applied to the shape file's attributes
- Create a Well Theme using the PETRA well data such as well header information, formation tops and zone data items
- Color a theme based on single symbol, unique values, or class breaks
- Copy, clip, and re-project a theme
- Send a theme to a layer in the Map Module's overlay
- Create and export a WSN list file from a Well Theme

***** IMPORTANT *****

This module requires the installation of ESRI's Map Objects 2.2. PETRA attempts to install it automatically when you select the Thematic Mapping menu or icon.

**** The Map Objects run-time install program, available on our Web site **** is not being deployed with the alldisks.exe update file. It's simply too large. It is being deployed with the server.exe and all CDs. Download the MO run-time install program into the Petra system folder, that is, Petrasrv for network installs or Geoplus1 for standalone installs. The MO run-time install file can be downloaded from the following link on the IHS web site: https://petraftp.ihsenergy.com/mo22rt.exe.. The MO run-time library is about 35 MB in size.

3D Visualizer

3DViz Module displays information of a project as it relates in three dimensions. This tool is tied directly to the PETRA database and is extremely easy to display wells (straight and directional boreholes, tops, digital logs, perfs, shows), subsea grids, isopach, PETRA map overlays, and cross section panels. It is easy to zoom in and out, rotate and shift the display, control the position of a light source (for surface shading), and print the result or capture an image.

Slip Logs Module

The Slip Log Module allows up to four (4) raster log images to be viewed simultaneously and scrolled independently or locked together. Logs are displayed horizontally across the screen similar to laying out logs on your desk. Formation tops to be picked or modified from raster log images. An alignment cursor function allows logs to be aligned and locked by picking a similar feature on each log or logs. The alignment cursor can be aligned at a specific formation top. Fault gaps can be displayed on the logs creating blank spaces in raster images as the image below the fault gap is shifted down in depth.

Log Correlation Module

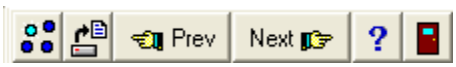
The LogCorrelationModule is a tool designed to time effectively correlate formations, unassigned markers, and pick intervals of pay from digital and raster logs. Due to the tool's focused design (smooth scroll, smooth pan, log slipping, and slip box functionality) at quickly recognizing log events, unusable functionality will not get in the way of correlating an immense amount of logs in a little amount of time.

Directional Well Module

The Directional Well Module allows you to:

- Plan horizontal and directional wells.
- View wells in an easy to use Profile View
- Post digital logs, tops, events, and surfaces along well paths for analysis and interpretation.
- Jump quickly to 3D Visualization to view your directional wells in 3D.

Main Module Icons



The Icons above are Highlight Well On Map (F8), Refresh Data From Disk, Display Previous Well In List, Display Next Well In List, Help, and Close and Exit. These icons are now located above the tabs to the right side of the Current Well, and the Tab that is clicked in the Main

Module dialog screen. For this example, the first well in the project is shown, and the **Project** tab has been clicked.

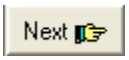
When the Map module is open, click the **Highlight Well On Map** icon to show the well that you are on in Main. The cursor points to the highlighted well on the map—the well is highlighted with a green highlight circle around the well symbol. If you have a well in Main that is not displayed on the Map, the cursor will not be displayed on the Map if Main and Map are on two different screens. If they are displayed on the same screen, the cursor will be displayed in the same relative position as the location of the Highlight Well On Map icon.

If you double-click a well in the Map module, you are returned to the Main module with that well selected. If the well is not in the Selected Well List in Main, the following dialog screen is displayed:

You will be returned to the Main module, but the well that you doubled clicked is not shown as it is not in the selected wells for Main.

Click this icon to refresh the data base tables to reflect any new data that has been added and is not currently being displayed.

Click this icon to display the previous well in the list of wells selected in Main.



Click this icon to display the next well in the list of wells selected in Main.

Click this icon to display the PETRA Help information.

Click this icon to close the current project and exit PETRA.

Map Overlay Viewer

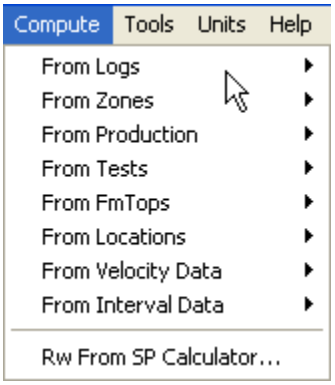
The Map Overlay Viewer, under the Tools>Map Overlay Viewer menu, allows the user to look at overlay files to determine their contents without loading the overlay in the Map Module. You

can also import cartographic data using various formats to take a look at the data to determine if you want that data loaded into the Map overlay.

Copy Printer File to Printer

This tool is located under the Tools>Copy File To Printer… menu. This tool copies a file saved in the native printer format directly to a printer that is directly connected to the machine. Files that were saved using the Print To File option can be printed using this tool.

Compute – Main Menu (Calculations and Transformation Tools)



Calculations and Transformation Tools

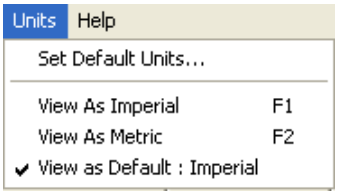
The real strength of PETRA lies in its robust set of calculation and transformation tools. User-defined equations can be evaluated to compute new Zone data, well logs, monthly production, or seismic horizons. Cumulative production can be computed for any data in the monthly production database. Reservoir properties, such as net, gross, net-to-gross ratio, phih, and phia can be computed from well logs over specific depth intervals and using various cutoff criteria. Simple formation thickness can be computed for multiple zones with corrections for deviated wells. Structure data can be used to compute true stratigraphic thickness for intervals. The advanced log transformations allow the user to write procedures called user models. User models contain multi-line arithmetic expressions with Boolean operators and are typically used to perform multi-well log analysis.

Units

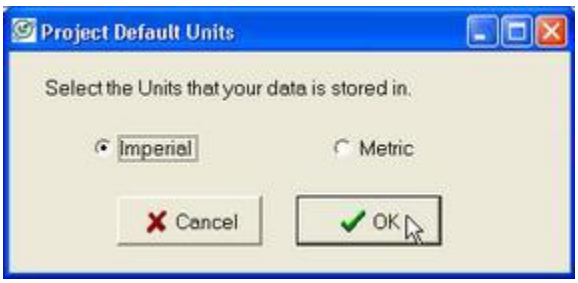
(A) PETRA assumes a single, consistent unit of measurement for all data in the database. A project's default units can be set to FEET (Imperial) or METERS (Metric). Once the default units are established, data can be viewed as either Imperial or Metric units.

(B) Setting the default data and depth units involves selecting the Units → Set Default Units... menu in Main.

When you click the Units menu, a drop-down menu is displayed.



The **Set Default Units...** displays the following dialog screen for setting the default Units for the project.



Click the radio button to the left of Imperial or Metric to select the units that your data is stored in.

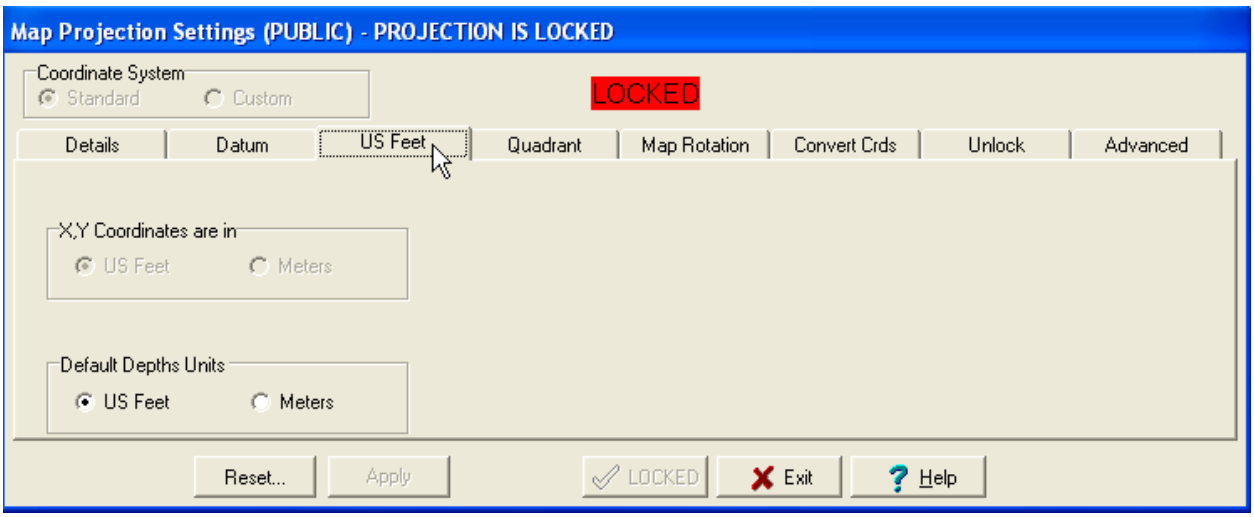
(C) Default units are set for both XY and depth coordinates. XY and Depth units can be set from the Map Projection options (Project → Settings → Set Map Projection).

To set the units for data that is read in when loading data that do not have units associated with the data, click the **ProjectSettings...→ Set Map Projection...** menu. When the ***Map Projection Settings*** dialog screen is displayed, click the **Feet** tab.

Note: The tab is labeled Meters, if you have set the XY Coordinates to meters when setting the projection for the project.

The **XY Coordinates are in** option is used to convert latitude/longitude values to XY Coordinates when loading or changing these values. The XY Coordinates are calculated based on the projection parameters that have been set.

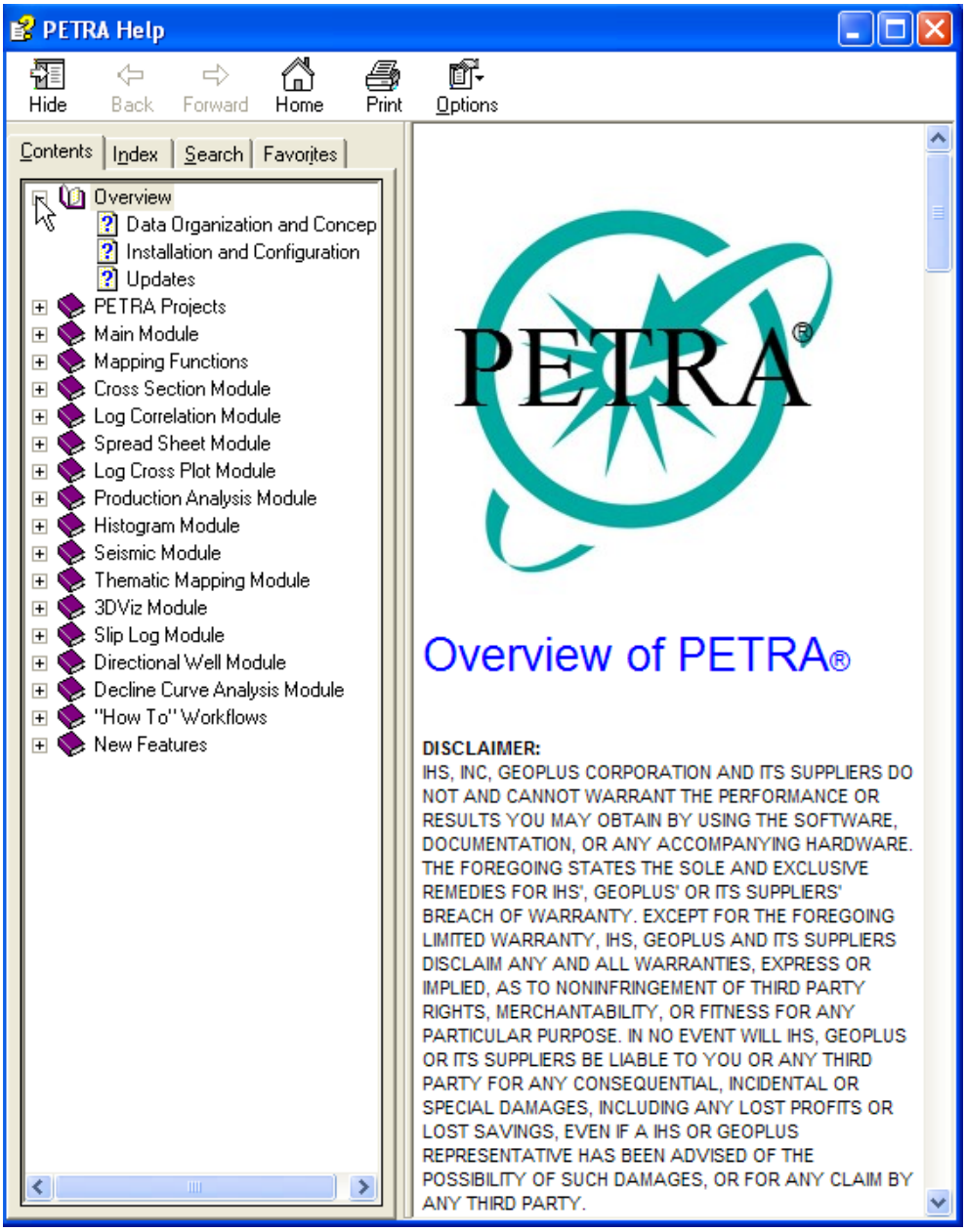
The **Default Depth Units** option is used when loading Tops and Curve data that do not have units assigned to them.



Help

There are several useful items under the Help menu.

1. When you click the **Help > Help...** menu, the help items that are available in PETRA are displayed from the beginning of the Help file.
2. Click the **plus** + to the left of the major topic you want to display information for.


PETRA Help
Hide
Back
Forward
Home
Print
Options
Contents
Index
Search
Favorites
Overview
Data Organization and Concep
Installation and Configuration
Updates
PETRA Projects
Main Module
Mapping Functions
Cross Section Module
Log Correlation Module
Spread Sheet Module
Log Cross Plot Module
Production Analysis Module
Histogram Module
Seismic Module
Thematic Mapping Module
3DViz Module
Slip Log Module
Directional Well Module
Decline Curve Analysis Module
"How To" Workflows
New Features
PETRA®
Overview of PETRA®
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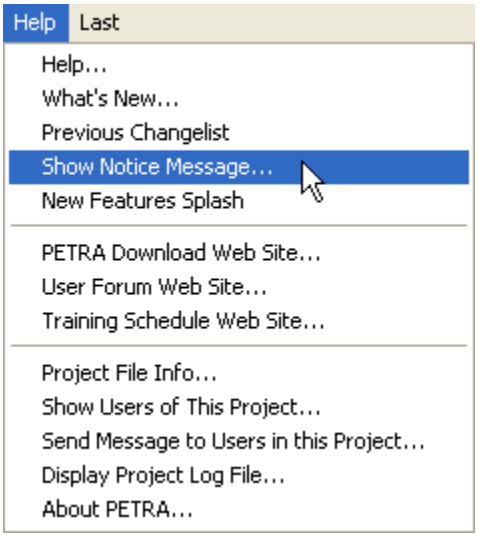
Other options in the Help drop-down menu are

- To take a look at the changes that have been made to PETRA, click the **What's New...** menu. The Whatsnew.html file contains all of the enhancements and bug fixes that have been made since 2/27/2009 to current date.

- Click the **Previous Changelist** option to see the enhancements and bug fixes prior to 2/27/2009. These enhancements and bug fixes are from 1/31/1998 to 2/27/2009.
- Click the **Show Notice Message...** menu to display a message at Login to PETRA and any time the menu is clicked.

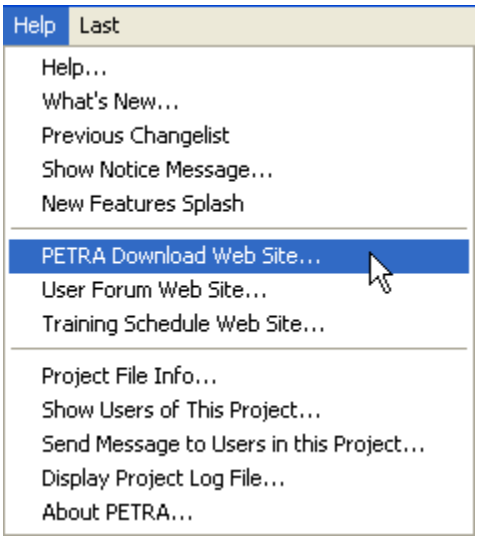


- Click the **New Features Splash** menu to display the latest features and enhancements for the current version of PETRA.
- The **PETRA Download Web Site...** menu takes you to the WEB where the download files are located. Click the **Software Downloads** link. When the PETRA® - Software Downloads page is displayed, scroll down to the appropriate download file that you want to use.

  You have the option of updating an existing standalone install by downloading a new standalone system (also used to update an older version of PETRA), as well as the server and client options.

  Note: You do not have to update your client install even if there is a newer version on the WEB than your client install.

  The link is: www.ihs.com/permission/en/pps-downloads.aspx



- Click the **OK** button to be connected to the download page.

Information
After downloading the update, close Petra before installing the update. For network version, all users must exit Petra before the update can be installed.
OK

- Click the **Software Downloads** link and select the appropriate option to update the standalone or the network version of PETRA.
    - The **User Forum Web Site…** menu takes you to the Energy Online User Community page, where you can sign in to view the posting for the various pages available as a PETRA SIG member. Sign up if you haven't already done so.
    - The **Training Schedule Web Site…** menu takes you to the PETRA and PetraSeis Training Calendar where you can register for a scheduled training session.
    - The **Project File Info…** menu displays information about the open PETRA project and related information.
    - The **Show Users of This Project…** menu displays the PETRA project path and the inactive and Active users that have accessed the project with date time stamps for each user.
    - The **Send Message to Users in this Project…** menu brings up a dial box where you can send a message to the users that are currently in the project.

- The **Display Project Log File…** menu displays the PL$$.TXT log file that is located at the root of the PETRA project.
- The **About PETRA…** menu displays the About PETRA dialog screen. This is the same dialog screen that is displayed when you click the large PETRA logo in Main.

Last

The Last menu keeps track of the last ten menu items that you have selected, which is a shortcut that can be used instead of navigating through the other menus for tasks that are used frequently.

Last
Flag Zones with perfs, cores, DSTs or shows...
Cumulative and Average Production Rates...
PETRA Project File (*.ppf)...
Isopach...
Footages (Reservoir Properties)...
Import LAS File...
Wells By Data Criteria Ctrl+S
IHS 298 Production (Comma)
IHS 297 Well Data (Fixed or Comma)
Program Options... Ctrl+O

3

Data Organization and Concepts

This section describes several simple but very important program design concepts, which you must familiarize yourself with to take full advantage of PETRA.

PETRA Projects

Review the section below that is titled ***Creating a New Project*** to learn about creating a new project and the two data types that a project contains, which are project data and parameter data.

- ***Project data*** consists of all well data, logs, seismic shot points, land grids and any computed data, such as contour grids. Project data can be shared with other team members given access to the project. Project data may reside on a network drive.
- ***Parameter data*** or Private Parameters cannot be shared with other team members. Private Parameter Data consists of all settings representing your view of a particular project. Such items as color preferences, mapping and cross-section options currently in effect are examples of parameter data. For single user projects, the project and parameter data can reside entirely on a local or network disk if so desired. Remember to backup your local project and parameter data frequently. For data that is stored on your network, make sure that the data on the network is backed up as well.

Sharing Projects

PETRA project data can be shared among team members.

Your private parameters must not be in the Shared Project\Parms folder. They must be in a path that no one else is writing to. An example is Shared Parms\User Name\Shared Project Name.

See the section below titled ***Creating a shared Project***.

Creating a shared project

Typically, a shared project resides on a network drive. When the project is first created using the PETRA Project Wizard, you select the **Create New Project** option. Next you specify that the project is shared. This allows you to establish two separate directories (folders), one for the

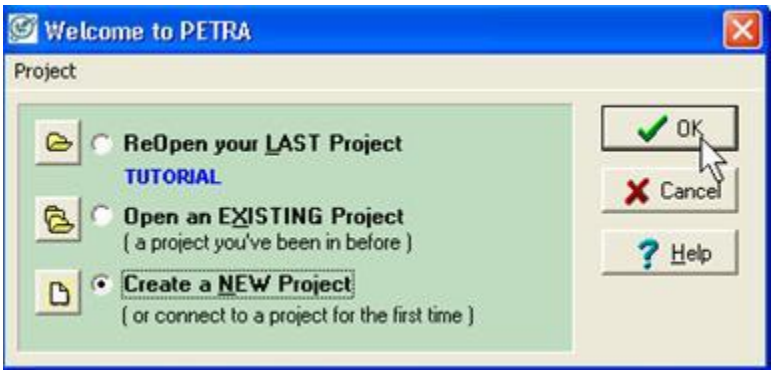
project data (database files, public parameters, overlays etcetera) and another for the private or personal parameters.

Note: When sharing projects, the directories (folders) should not have the exact same path for the project data and the personal parameters. The personal parameter database cannot be shared with another user. The dialog screens below show the steps to create a new project that is shared.

When you open PETRA, there is an option to Create a NEW Project.

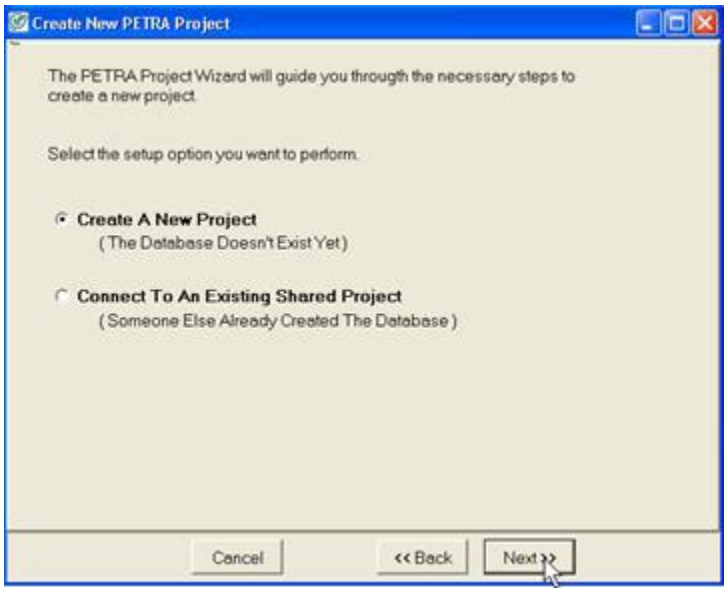
1. Click the Radio button to the left of the **Create a New Project** option.
2. Click **OK** button with the green check.

   This starts a Create New PETRA Project wizard.



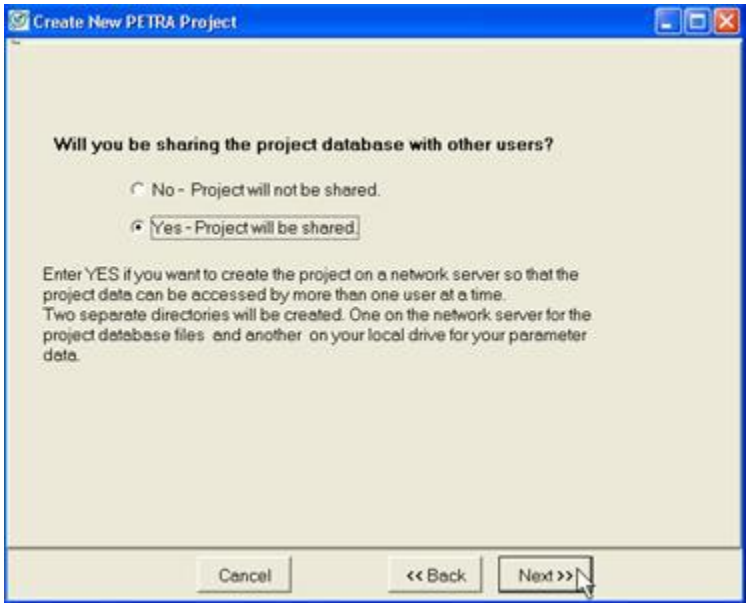
3. Click the Radio button to the left of the **Create A New Project** option.

   The ***Create New PETRA Project*** screen opens.


Create New PETRA Project
The PETRA Project Wizard will guide you through the necessary steps to create a new project.
Select the setup option you want to perform.
Create A New Project
(The Database Doesn't Exist Yet)
Connect To An Existing Shared Project
(Someone Else Already Created The Database)
Cancel
<< Back
Next >>

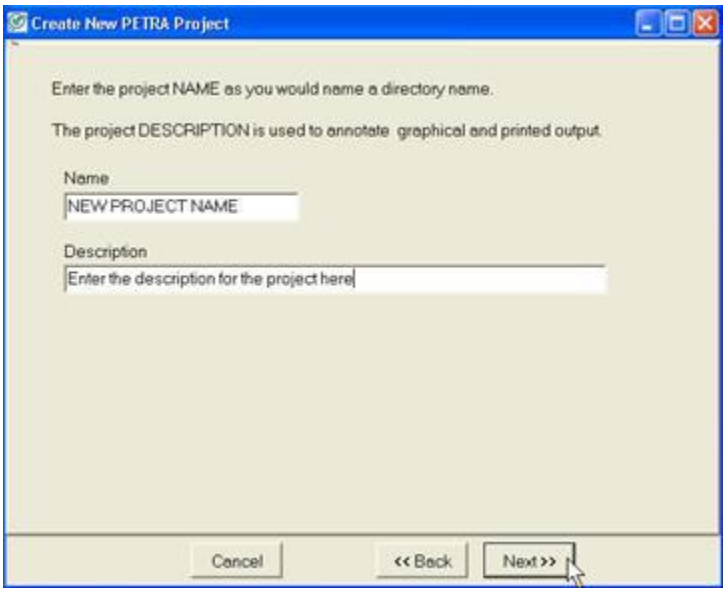
4. Click **Next**.

   A second ***Create New PETRA Project*** screen appears.


Create New PETRA Project
Will you be sharing the project database with other users?
No - Project will not be shared.
Yes - Project will be shared.
Enter YES if you want to create the project on a network server so that the project data can be accessed by more than one user at a time.
Two separate directories will be created. One on the network server for the project database files and another on your local drive for your parameter data.
Cancel
<< Back
Next >>

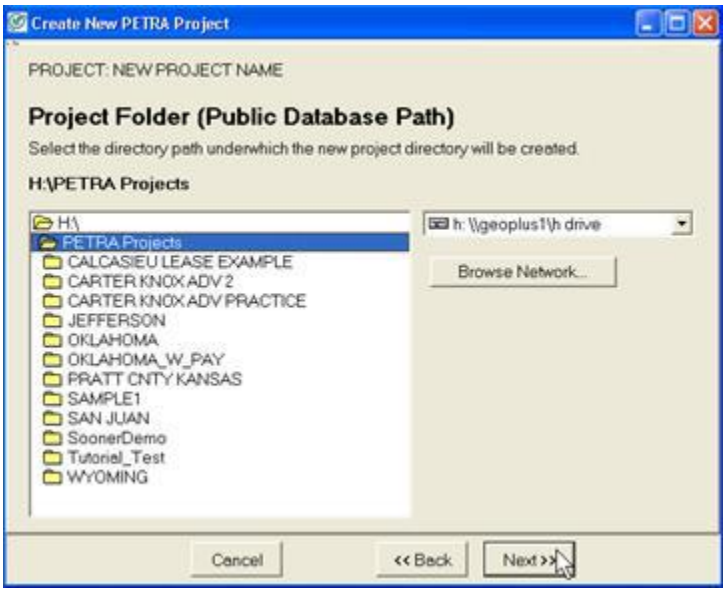
5. Click the Radio button to the left of **Yes - Project will be shared,** and then click **Next.**

   A third ***Create New PETRA Project*** screen appears.


Create New PETRA Project
Enter the project NAME as you would name a directory name.
The project DESCRIPTION is used to annotate graphical and printed output.
Name
NEW PROJECT NAME
Description
Enter the description for the project here
Cancel
<< Back
Next >>

6. Enter the Name for the project and the Description for the project, and then click **Next.**

   A fourth ***Create New PETRA Project*** dialog screen appears allowing you to select the directory path for the shared project to be stored on the network.



7. Double-click the upper most folder where the project is to be created. You see the path used for the project. In this example, the path is H:\PETRA Projects, which appears above the directory selection area.

Note: You do not drill down to a project sub folder. PETRA creates the project folder for you as well as the subfolder and files needed for your public parameters.

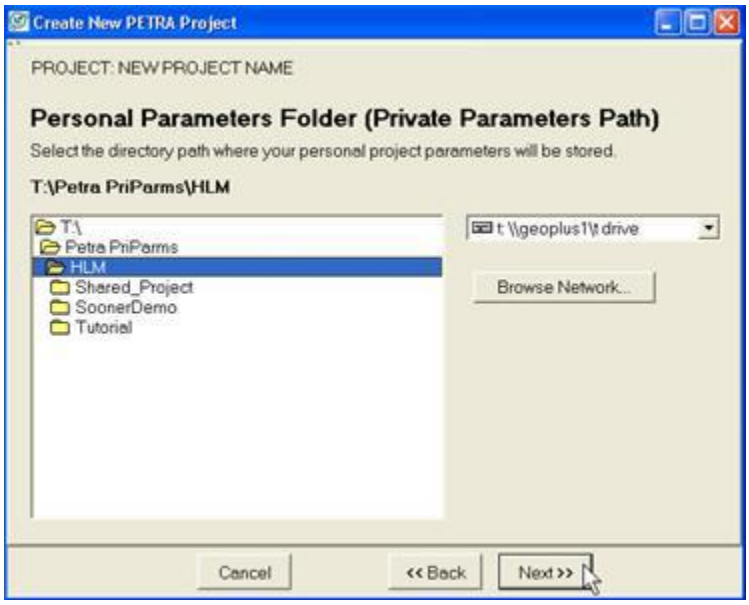
8. Select the directory path for the personal parameters.

   The personal parameters can be stored on the local machine in the C:\geoplus1\projects folder; however, it is highly recommended that you store this information on the network so that the data is backed up on a regular basis. If you store the information on your local machine, remember to back up the data on a regular basis.

9. Double-click the upper most folder where the personal parameters are to be stored.

   You see the path displayed above the directory selection area. In the example below, the path is T:\Petra Priparms\HLM.

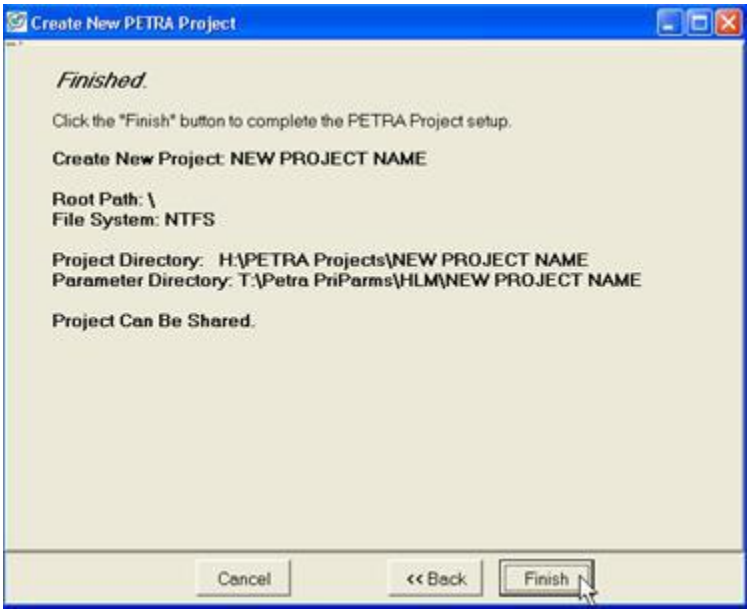
   Note: You do not drill down to a project sub folder. PETRA creates the project folder for you as well as the subfolder and files needed for your private parameters.



10. Click **Next**.

    A dialog screen with ***Finished*** is displayed along with the paths for the Public (Project Directory), and the Private (Parameter directory) parameters. You see the message "Project Can Be Shared." You must not see the project name duplicated in either path. PETRA creates the Public and Private project folders along with the tables, files and

project.ini files that are needed for the new project.



11. If you see the project name duplicated, like the examples shown below, you need to click the **Back** button and follow the procedure outlined above, making sure that you do not select the project name for either of the paths.

    \\Geoplus1\H Drive\TempProjects\Shared_Projects\CREATING A PROJECT\CREATING A PROJECT

    OR

    \\Geoplus1\H Drive\Petra PriParms\HLM\CREATING A PROJECT\CREATING A PROJECT

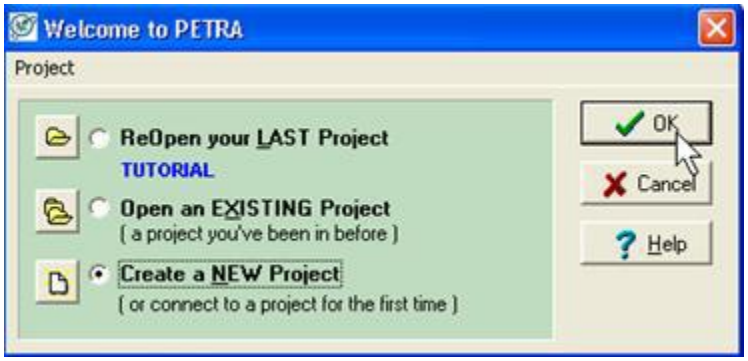
12. Click **Finish** on the lower right of the screen.

Note: If you want to access the shared project, select **Create New Project**, and then select **Connect to An Existing Shared Project**. You are first asked to select the project you want to connect to by choosing a drive map path or by clicking the **Browse Network…** button to point to the remote project's directory.

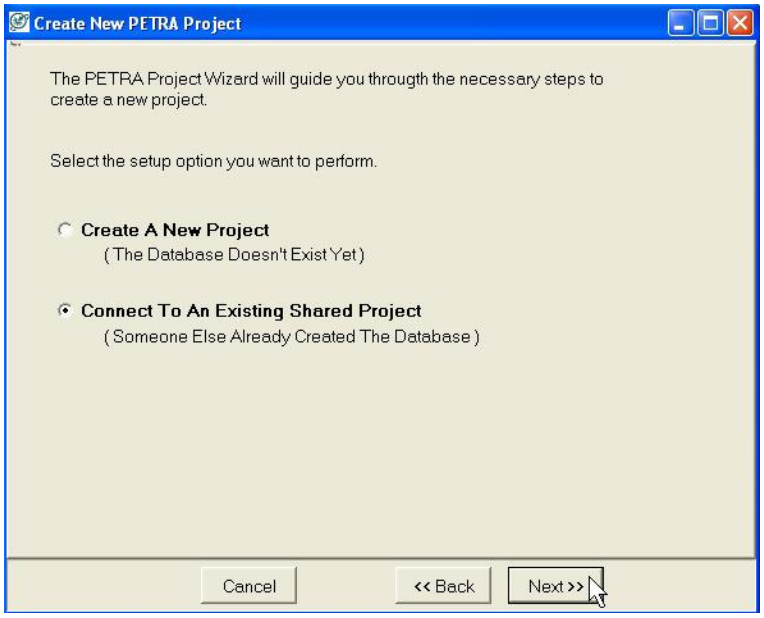
Next, the Project Wizard guides you to set up a Personal Parameter Folder (Private Parameters Path) on your local or network drive. A network drive is preferred, as the network drives are generally backed up on a regular basis. If you choose a local drive, make sure the local project data is backed up on a regular basis.

1. Click the **Create a New Project** Radio button, and then click the **OK** button with the green check.

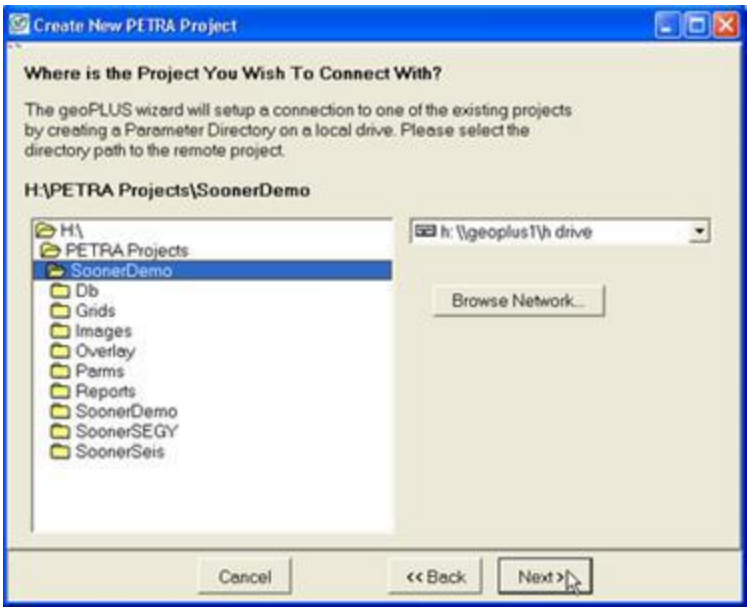
   This starts the Create New PETRA Project wizard.



2. Select the option to **Connect To An Existing Shared Project**, and then click **Next**.


Create New PETRA Project
The PETRA Project Wizard will guide you through the necessary steps to create a new project.
Select the setup option you want to perform.
Create A New Project
(The Database Doesn't Exist Yet)
Connect To An Existing Shared Project
(Someone Else Already Created The Database)
Cancel
<< Back
Next >>

3. If users connecting to the shared project click the drop-down drive mapping button, they drill out to the project and double-click the project folder.



OR

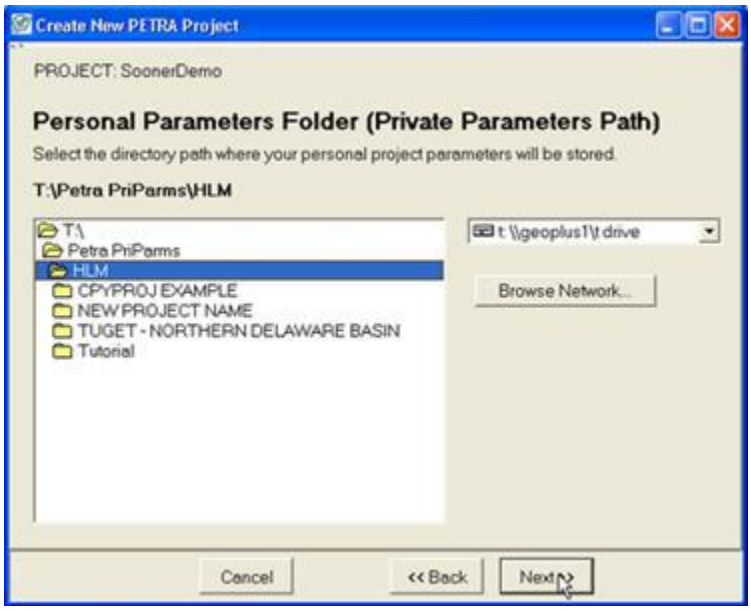
4. If users connecting to the shared project use the **Browse Network...** button

, when they double-click the project folder, they must select the project .INI file and click the Open button.

   A dialog screen like the one above is displayed.

5. Click **Next**.

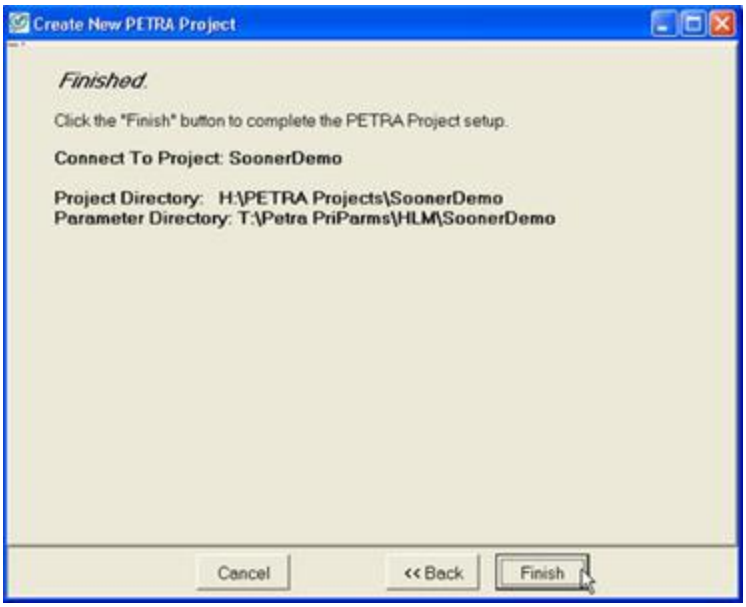
6. Select the directory path for the personal parameters. Read about selecting the personal parameters in the section above.
7. Click **Next**.



A ***Create New PETRA Project*** dialog screen with ***Finished*** is displayed along with the paths for the Public (Project Directory), and the Private (Parameter directory) parameters.

You see a message "Project Can Be Shared." You must not see the project name duplicated in either path. PETRA creates the Public and Private project folders along with the tables, files and project.ini files that are needed for the new project.

8. Click **Finish**.



Note: If you see the project name duplicated in the Parameter Directory path, like the example shown here,

\\Geoplus1\H Drive\Petra PriParms\HLM\CREATING A PROJECT\CREATING A PROJECT

click the Back button and follow the procedure outlined above, making sure that you do not select the project name. The project name is created for you with the default private parameter files and the project.ini files needed for the shared project.

Shared project data is live

When sharing projects, all concurrent users of the project have immediate access to any and all changes made by any other user. Since some spread sheet displays contain a local copy of the data, it may be necessary to refresh the spread sheet to see the latest changes. The main screen contains a refresh icon , Refresh Data From Disk, for this purpose. You can find a menu item in all modules to refresh data. Some modules also have an icon that can be used to refresh the data.

Project Data

Project data consists of all well data, logs, seismic shot points, land grids and any computed data, such as contour grids. Project data can be shared with other team members given access to the project. Project data may reside on a network drive.

Note: It is critical that you have a backup plan in place to backup your project data. Read more about this in the Hardware Requirements paragraph above.

Unique Well Identifier (UWI)

Each well that is stored in a PETRA project must have a Unique Well Identifier or UWI. Each UWI contains from 1 to 20 characters that uniquely identify the well. Typically for U. S. domestic data, the UWI is the API number for the well. The API number that ends in 0000 is the original well. Sidetracks and Re-completions of the original well are considered as separate wells in PETRA. The sidetrack is recorded in the 11th and 12th digits and the re-completion is recorded in the 13th and 14th digits of the API number.

Well Sequence Number (WSN)

The database assigns a unique numeric identifier for each well called the Well Sequence Number or WSN. The WSN is used for data retrieval only and cannot be modified. WSN's are not reassigned when wells are deleted. A well's WSN is unique for a given project. The same well in another project does not necessarily have the same WSN.

Well label

The Well Label is a 1 to 32 character data field that can be customized for well identification. Many times, a project contains several wells with the same well name or number. PETRA provides the Well Label as a means to create an identifier using all or portions of other well data fields, such as operator, lease name, section-township-range, and so forth. The Well Label can be customized for currently selected wells or for all wells. There is also an option to store the computed label in the Sort Key Field for the well and is displayed on the Well tab in Main. The default Well Label is the Unique Well Identifier.

Zones

PETRA provides for an unlimited number of user-defined data fields to be stored in the project database. User-defined well data are organized into groups called zones. A zone is like a table

containing one or more columns of numbers, dates, or text. Rows in the table correspond to wells.

Zones have a corollary with geologic zones by the fact that they are defined by a depth interval. Zones can be referenced to measured depths, subsea TVD, but are more frequently referenced to formation markers or tops. When a zone references an upper and lower formation marker, PETRA can quickly evaluate the tops to determine the appropriate depth interval for any given well.

The Zone database provides a logical and efficient organization for managing geological mappable well data. Items such as isopach, TST, net pay, average porosity, etcetera, can be grouped together under the zone corresponding to the depth interval of interest.

Many functions within PETRA can process several zones at once. For example, you can compute isopachs or footage summations (gross, net, porosity feet) from well logs, simultaneously, for all zones in the project.

Zones are defined by a name, description and depth interval reference. Normally, the depth interval refers to formation tops stored in the FmTops table.

Each PETRA project contains a predefined zone called WELL. The WELL zone contains several predefined data fields for storing items such as elevation, cumulative production, and various dates. You can add new fields to the WELL zone. The system-defined fields in the WELL zone cannot be deleted; however, any Zone and/or Data Item that you create can be deleted from the table.

Zone data items

Zones can contain an unlimited number of zone data items or data fields. A Zone item may contain a number, date, or text value. Numeric and date values can have a 1-4096 character remark field. Dates are stored as mm/dd/yyyy. Text data items consist of a 1-4096 character string with the data for the item being stored in the Text Item or Remark column for the Zone/Item Name.

Note: You do not enter text in the ZValue data field for a data item. Text is stored in the Text Item or Remark column for the data item.

PETRA stores all formation tops, bases, or markers in the FmTops table. The FmTops table is similar to the zone tables with the exception that the depth interval reference is ignored. This tutorial refers to any data item stored in the FmTops table as a top. Tops can be viewed and edited as either measured depth or subsea TVD; however, the tops database stores values as a measured depth. Subsea (sub datum) or TVD values are computed when needed using datum elevations and directional surveys for the wells.

Tops are named using a 1-30 character name and an optional 1-8 character source code.

Each value in the tops database can have a 1-8 character quality code assigned and a 1-4096 character remark field.

The FmTops table sometimes appear with a list of zones for selection depending on the nature of the function being performed.

Interval Data

Interval data stores data to a specific depth interval that doesn't fit well with the traditional zone concept, such as data that is too fine (for example, core descriptions) or too coarse (for example, mud weights or biostratigraphic information) to fit inside two formation tops.

PETRA stores interval data in tables and fields similar to a spreadsheet. The table stores related interval data in a spreadsheet, where each interval is stored as a separate row. This data can be used to derive grids in the map module, perform additional computations within the PETRA database, illustrate in PETRA's cross-section tool, and converted into digital logs.

Inside a table, each interval is stored as its own row, and information about that interval is stored in fields or columns in that row. All tables come with a few fields, TOP, BASE, DATE1, DATE2, QUALITY, and FMNAME, but you can add **user defined fields** containing numbers, dates, or text. In addition to the standard fields, the LITH table in the example below contains the field **Desc** which stores lithologic descriptions.

The difference between Zones and Interval

PETRA defines a Zone as a specific interval defined by a discrete top and a base. Usually a zone's top and base are defined by specific formation tops so that the zone covers a consistent lithostratigraphic unit. Inside each zone, PETRA stores a Data Item such as isopach, net pays, or log measurements that relate to that zone. Since zones and their data items are shared across all wells in a project, this method of organizing data makes storing and mapping single value data for a specific formation much easier. As an example, mapping all the isopach values for a specific formation is much easier when the values are all stored in one common zone data item for each well.

Zones are limited, however. Cuttings or core data may actually subdivide a specific zone into several different units based on lithology, color, porosity, or other petrophysical characteristics. Similarly, data such as a mud weight or a biostratigraphic presence can be larger than a single zone's definition. Capturing all this information with the traditional zone model is cumbersome as it leads to a proliferation of new, well specific zones.

The interval method, on the other hand, is designed to store information about the wellbore without using zones. The interval concept stores data too fine for the zone concept (such as core

and lithologic descriptions) as well as data that exists completely outside the normal stacked strata concept (such as logging runs or mud weights). Interval data also handles data overlapping different formations, such as paleostratigraphic data.

Well selection

Many times users need to view information or perform computations on an isolated group of wells in the project. This group of selected wells must somehow be chosen from all other wells making up the project. PETRA contains several tools to perform well selection. Probably the most often used well selection method is searching the database for wells meeting certain data criteria, values, or ranges. PETRA provides an extensive list of data criteria for well selection. In the Main module, click the **Wells → Select → By Data Criteria...** menu or the **Select Wells By Data** icon .

For example, PETRA easily handles complex queries such as, "Find all wells that have a porosity log, cum gas production greater than 1000 mcf and total depth greater than 9000 feet, and completed after 01/01/1990." Well selection lists can be saved to a disk file and reloaded when needed.

Each PETRA module, such as Map, Cross Plot, etcetera, contains its own list of selected wells. Wells selected in the Main module are those wells displayed in the well list to the left to the tabs. This list of selected wells is the default well list for other modules. You can select a different set of wells to be displayed in the other modules. When you open another module, you can use the well selection options for that module.

Missing or null data values

PETRA displays a missing or null value as a blank field. Therefore, to set a value to null, simply blank out the value and click the **Save**

button.

Creating a New Project

This section illustrates how to create a new PETRA project and import ASCII Tabular well data and log curves from LAS files.

New project overview

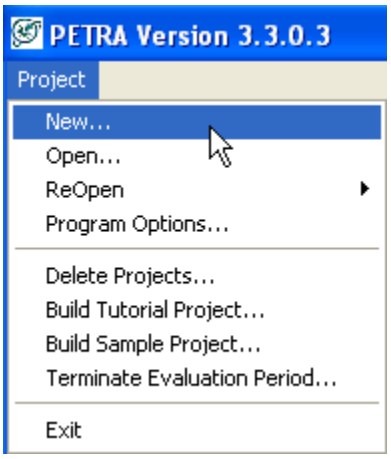
PETRA projects typically store all data relevant to a particular geographical area. The Project Name is used to build the directory path on both local and network hard drives. Projects consist of two data types, project data and parameter data.

- ***Project data*** consists of all well data, logs, seismic shot points, land grids and any computed data, such as contour grids. Project data can be shared with other team members given access to the project. Project data may reside on a network drive.
- ***Parameter data*** consists of all settings representing your view of a particular project. Such items as color preferences, mapping and cross-section options currently in effect are examples of parameter data. For single user projects, the project and parameter data can reside entirely on a local or network disk if so desired.

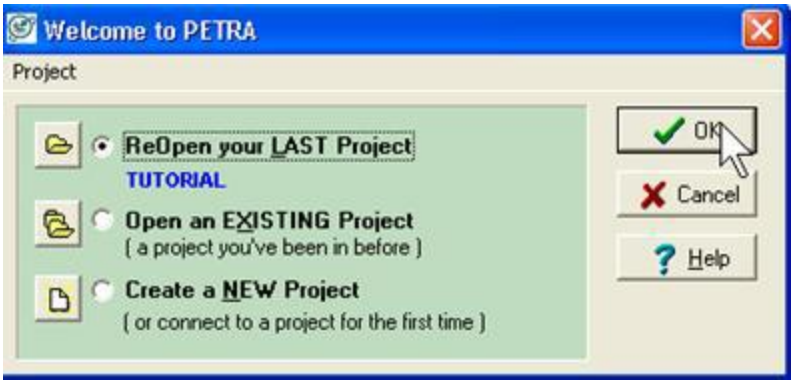
During PETRA installation, a PROJECTS directory is created under the installed program directory (Geoplus1 by default). Unless you are sharing project data with others, it is highly recommended that you create all PETRA projects under the PROJECTS directory path.

Directory paths need not already exist prior to creating a new project. You can type in a non-existent path structure and PETRA creates all sub-directories for you.

New projects can be created from Main's Project → New… menu.

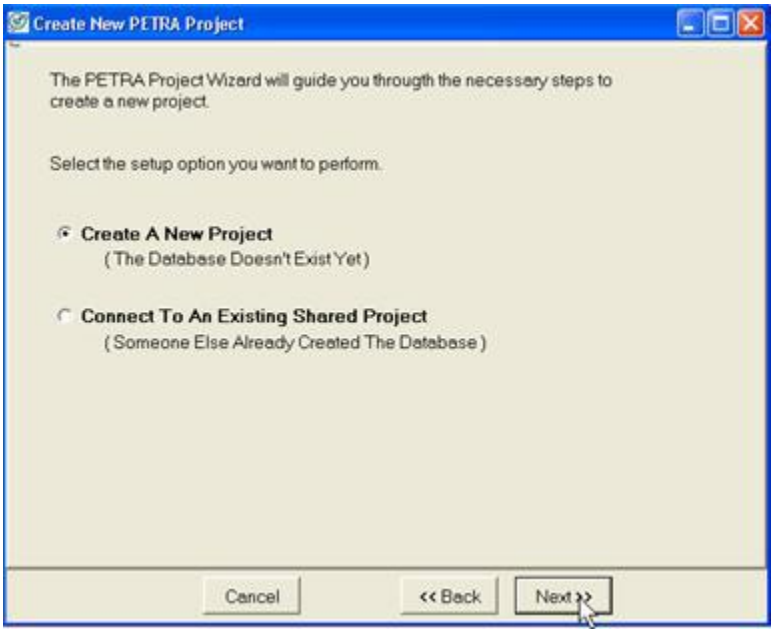


Any currently opened project must be closed prior to creating a new project. When ready to create a new project, select the **Project → New...** menu, in the Main module. This invokes the Project Setup Wizard. From the ***Welcome*** dialog box when you first log into PETRA, click the radio button to the left of **Create a NEW Project** to invoke the Project Setup Wizard.

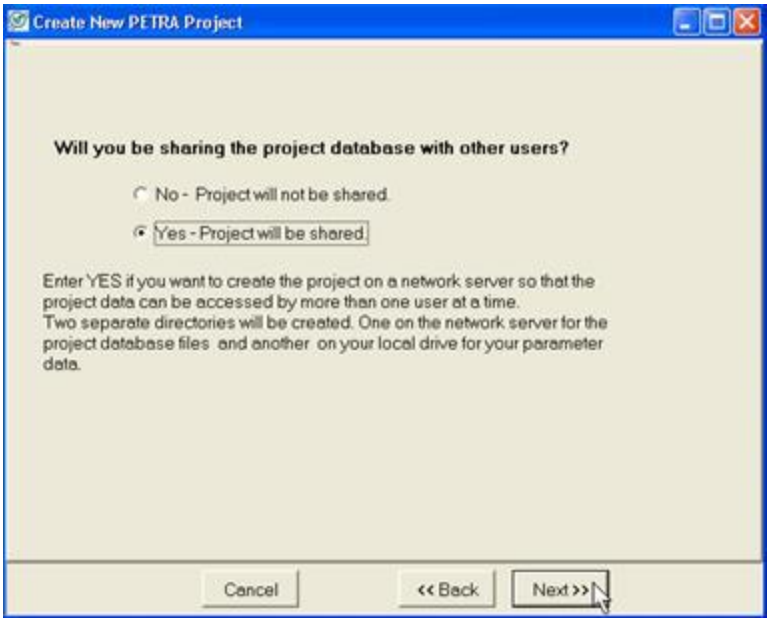


When the Project Setup Wizard starts, it guides you through the project setup process.

You can Create A New Project or create the necessary directory links to Connect To An Existing Shared Project. Click the appropriate radio button. For this example, select the **Create A New Project** option, and then click **Next**.

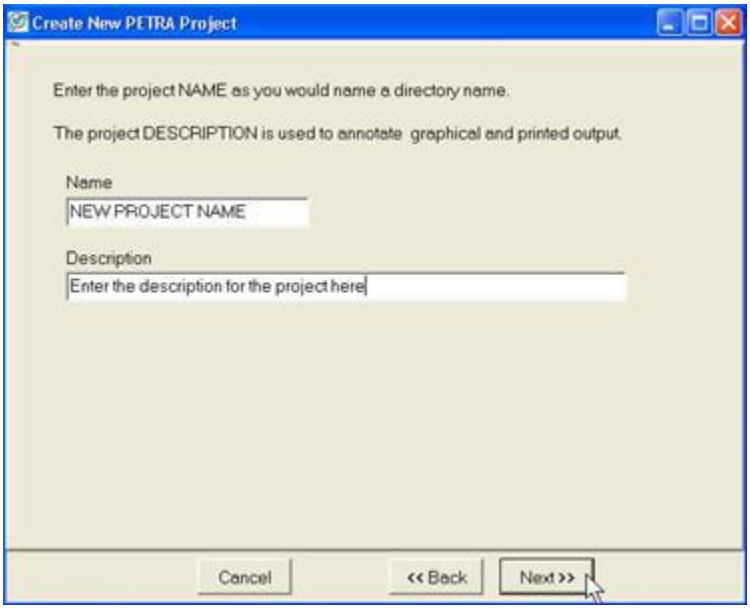

Create New PETRA Project
The PETRA Project Wizard will guide you through the necessary steps to create a new project.
Select the setup option you want to perform.
Create A New Project
(The Database Doesn't Exist Yet)
Connect To An Existing Shared Project
(Someone Else Already Created The Database)
Cancel
<< Back
Next >>

New projects can be designated as shared or non-shared. Shared projects are typically set up on a network drive and have the project database stored in a different directory than the private parameter data. Click the radio button to the left of **Yes - Project will be shared**, and then click **Next**.


Create New PETRA Project
Will you be sharing the project database with other users?
No - Project will not be shared.
Yes - Project will be shared.
Enter YES if you want to create the project on a network server so that the project data can be accessed by more than one user at a time.
Two separate directories will be created. One on the network server for the project database files and another on your local drive for your parameter data.
Cancel
<< Back
Next >>

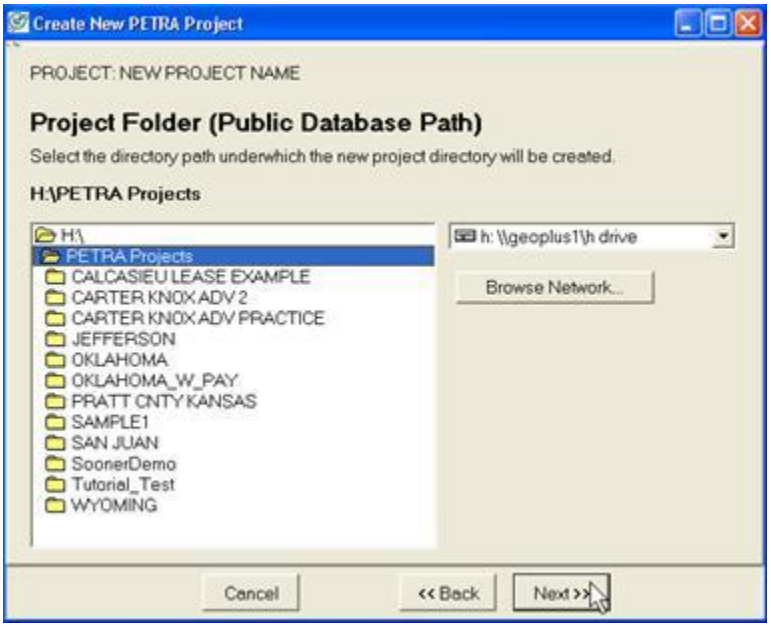
Project name and description

The project name is used to identify the sub directory name for project and parameter data paths. Enter a descriptive acronym for the project. Windows 2000/XP/Vista/Windows7 directory names may contain blanks and can be longer than the old 8-character DOS names. The project description is used as a title for identification on graphical displays and can be modified after the project is created. Click **Next**.


Create New PETRA Project
Enter the project NAME as you would name a directory name.
The project DESCRIPTION is used to annotate graphical and printed output.
Name
NEW PROJECT NAME
Description
Enter the description for the project here
Cancel
<< Back
Next >>

Project database directory path

The project database path defines the directory path where the shared project data reside. This directory contains the bulk of the project's data so choose a drive with sufficient space. If the project is shared among team members, select a network drive. Click **Next**. The path can be a drive letter that has been mapped, or the UNC path can be used. For instance, the example shown below is a drive letter mapping path. H:\Petra Projects. An example of the UNC path is \\geoplus1\h drive\Petra Projects.

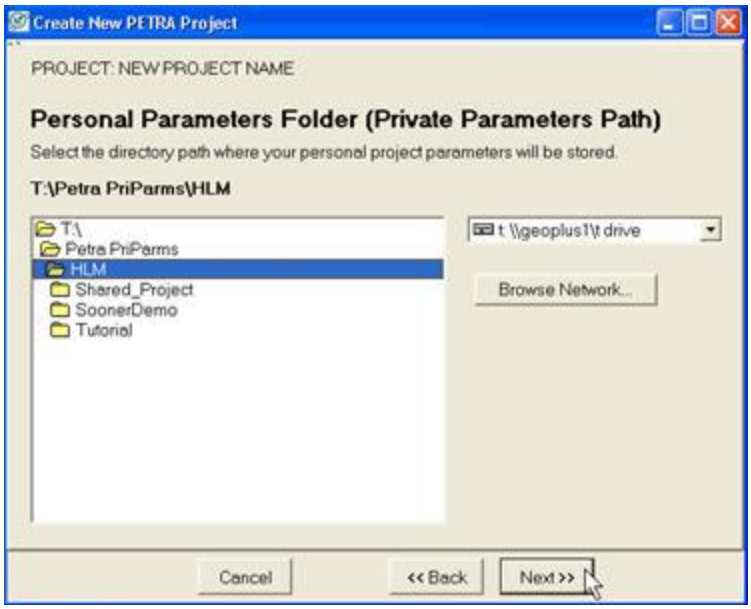


Personal parameters directory path (shared projects only)

The parameter data path defines the directory path where you want your own parameters stored for a shared project. If the project is not shared, the parameter directory is the same as the project database directory. The path can be a drive letter that has been mapped or the UNC path can be used. For instance, the example shown below is a drive letter mapping path. T:\PetraPriparms\HLM. An example of the UNC path is be

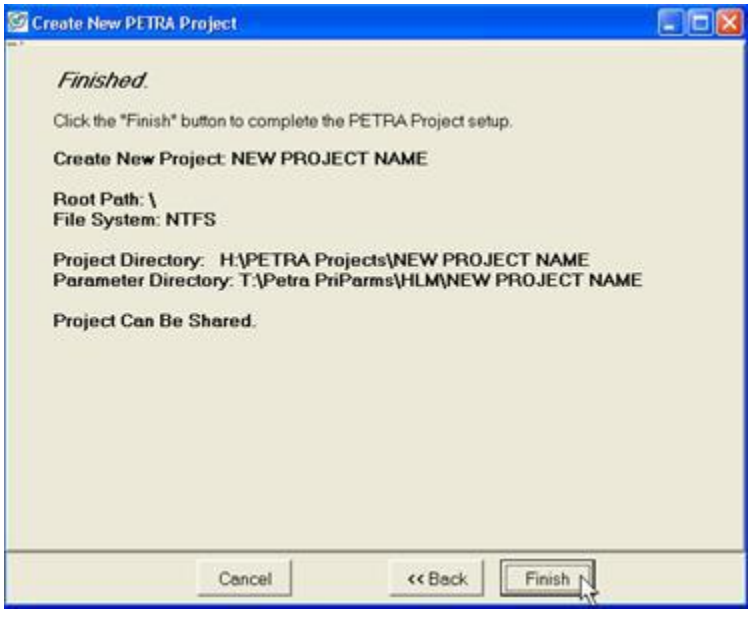
\\geoplus1\t drive\PetraPriparms\HLM.

1. Select the directory path.
2. Click **Next**.



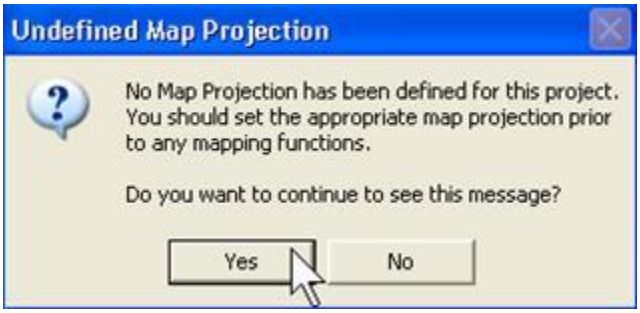
The information for the project is displayed on the ***Finished*** dialog screen.

The project name should never be repeated twice for the Project Directory or the Parameter Directory. If you see the project name twice, click the **Back** button and re-select the upper folder where the project is to be created or the upper folder where the private parameters are to be created.

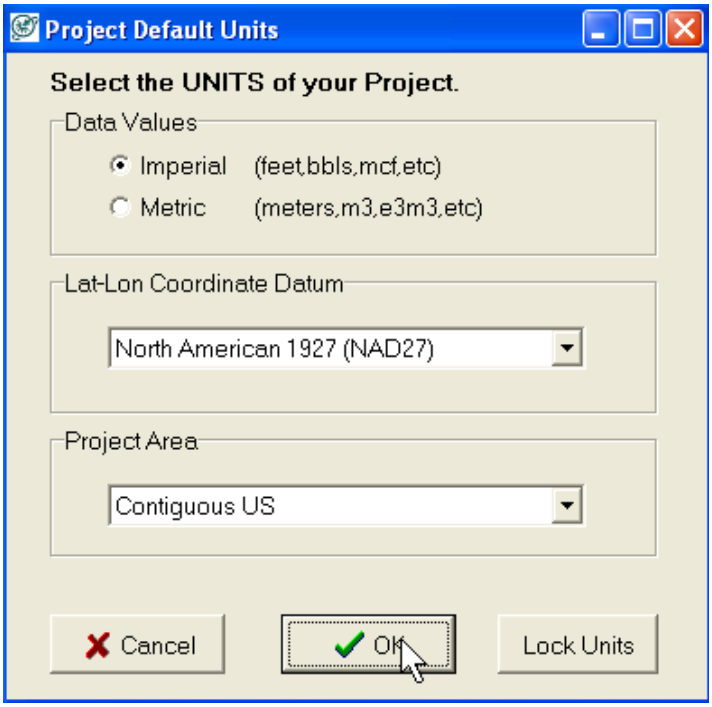


After completing the new project wizard, the new project's database is created and the project is initialized with default values. A single Project Tab is displayed on the main screen. Only a few

options are available until wells are added to the project. Since this is a new project, the Projection for the project has not been set. You see a message letting you know that you need to set the projection for the project. Click **Yes**.

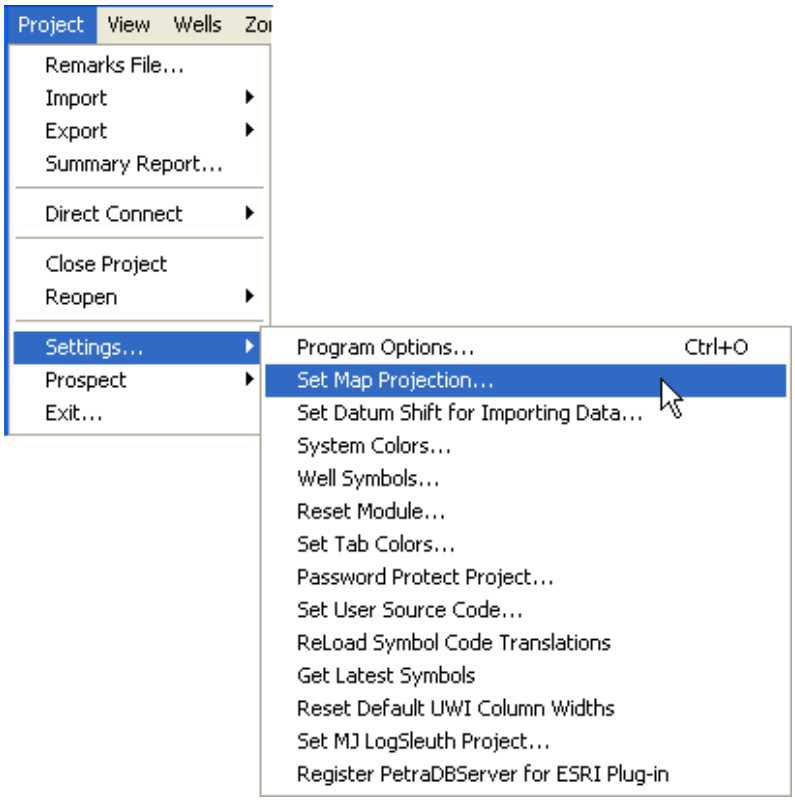

Undefined Map Projection
No Map Projection has been defined for this project.
You should set the appropriate map projection prior
to any mapping functions.
Do you want to continue to see this message?
Yes
No

When the ***Project Default Units*** dialog screen is displayed, click the **OK** button with the green check to set the Data Values to Imperial.

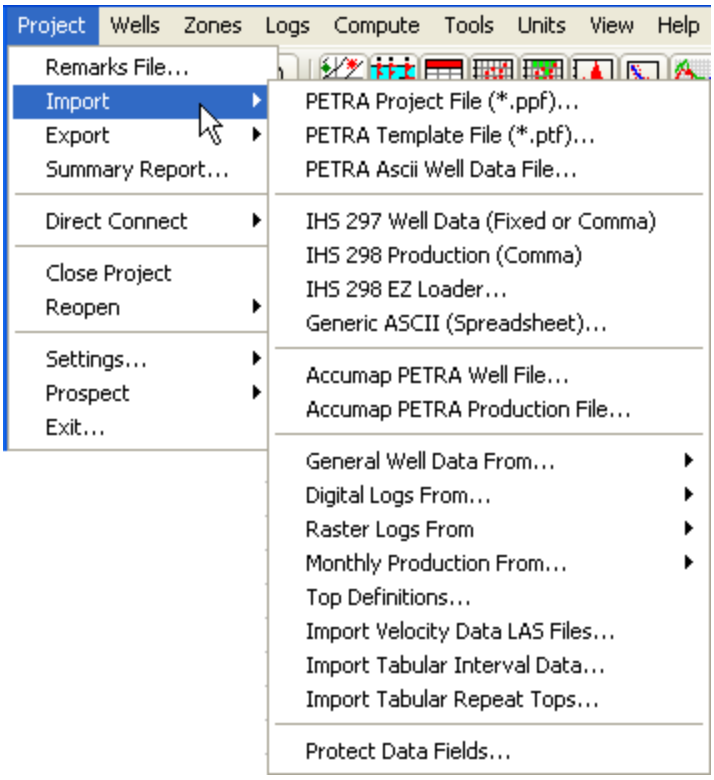


To set the projection

1. Click the **Project→Setting...→Set Map Projection...** menu.
2. Select the appropriate projection for the project.



3. Click the **Project→Import→** menu and select the appropriate import option for the data that you have to load into the project to load data into the project.



Note: Set the projection, and then load the well data into a project before attempting to load cartographic data.

To add Wells manually

1. Click the **Wells→Add A New Well...** menu.
2. Enter each UWI (API number), and then click the various tabs to fill out the various data fields.

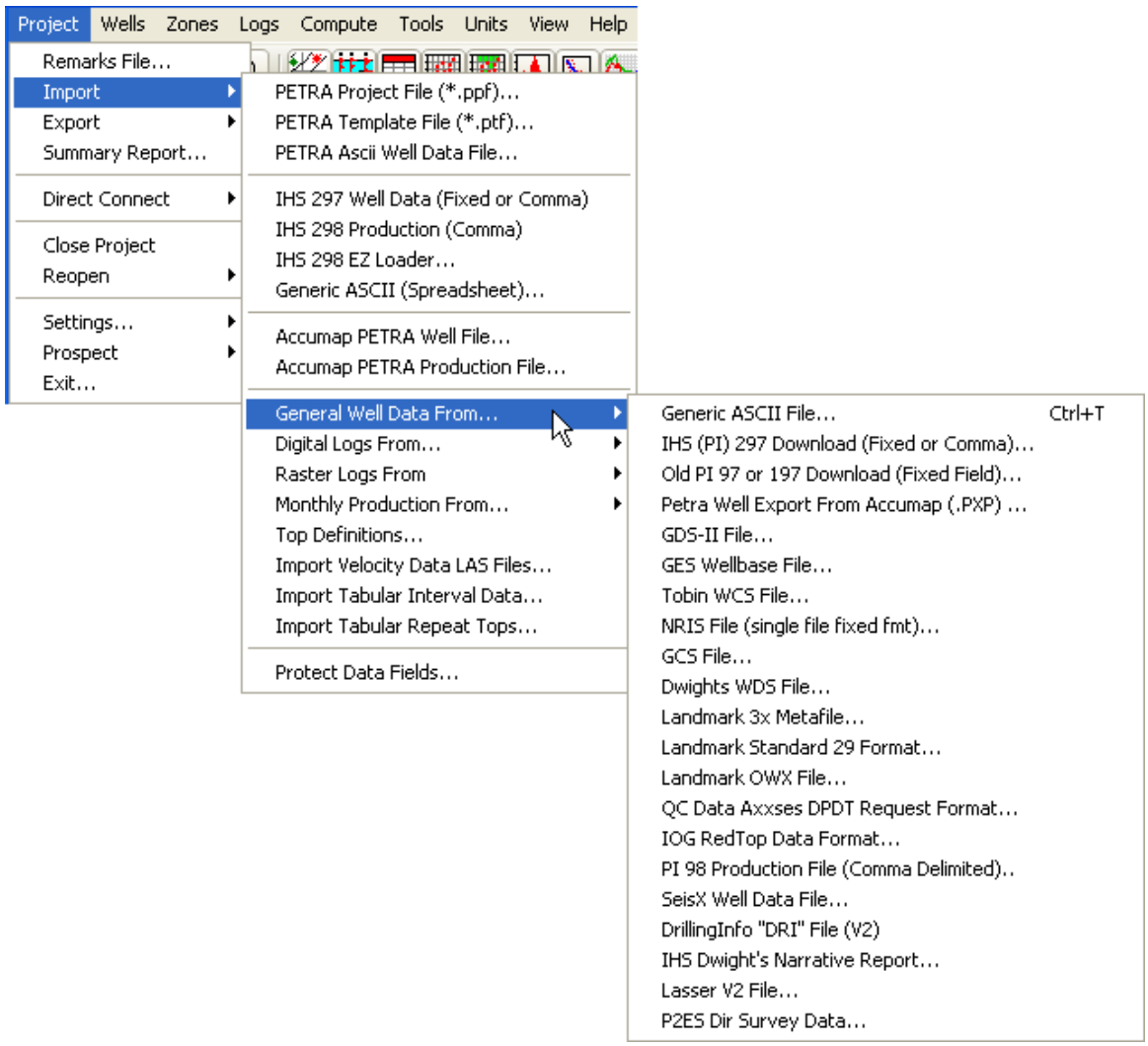
   Typically, wells are added by importing well data from either one of the commercial data suppliers or from simple tabular ASCII files by clicking on the **Project→Import→** menu

Importing well data

PETRA provides several options for importing well and other data into a project database. The import options are located under the Project menu on the main screen. If you have another project, you can export data in the PETRA Project File (*.PPF) format and load that file directly into the new project. There is a PETRA Ascii Well Data File that is a published format for data

to be loaded directly into PETRA as well. This format is used by several data providers and is the preferred format when obtaining data from a vendor.

The Project→Import→General Well Data From… menu includes options for importing data from several different sources.



Well Data and Tops

- ***Generic ASCII File (Function key Ctrl+T).*** This is a tabular file consisting of well data formatted so that each well occupies a row or file record and each data field is a column. Sometimes called a Spreadsheet and is user defined.

Note: We cannot load a .XLS file format.

- ***IHS (PI) 297 Well Data (Fixed or Comma)***, which is commercial well data exported from IHS' CD-ROM software or on-line service. This file format is Y2K compliant. (The year contains all four digits.)
- ***Old PI 97 or 197 Download (Fixed Field***. **Note**: We highly recommend using the 297 Well Data File as these files are not Y2K compliant. (The year only contains the last two digits of the year. A year with 09 for the year could mean 1909 or 2009.)
- ***Petra Well Export From Accumap (.PXP)…Data exported from Accumap in a format that can easily be imported into PETRA.***
- ***Geological Data Services-II, (GDS-II File)***, which is Well Data and Formation Tops from Geological Data Services.
- ***GES Wellbase ASCII vers. 2***, which is an exported ASCII file format from Geographix.
- ***Tobin WCS***, which is basic well header and location information.
- ***NRIS - Okla. Geol. Society (WHFF) File***, which is well data from Oklahoma Geological Survey.
- ***Geological Consulting Services, a GCS File***, which is Formation Tops from Geological Consulting Services.
- ***Dwights WDS file***, which is the Dwights Well Data System CD-ROM download format.
- ***Landmark 3x Metafile***, which is an ASCII file that contains well data exported from Landmark and other systems.
- ***Landmark Standard 29 Format***, which is an ASCII file which contains well data exported from Landmark and other systems
- ***Landmark OWX File***, which is an ASCII file which contains well data exported from Landmark and other systems.
- ***QC Data Axxses DPDT Request Format File***.
- ***IOG Red Top (Kansas Data Format File)***
- ***PI 98 Production File***, (Comma Delimited), (IHS 298 is recommended as it is Y2K compliant), from which a limited amount of Well Header Information can be loaded.
- ***SEISX Well Data File***
- ***DrillingInfo DR File (V2)***
- ***IHS Dwight's Narrative Report***

- ***Lasser V2 File***
- ***P2ES Dir Survey Data***
- ***Import from OpenWorks…***

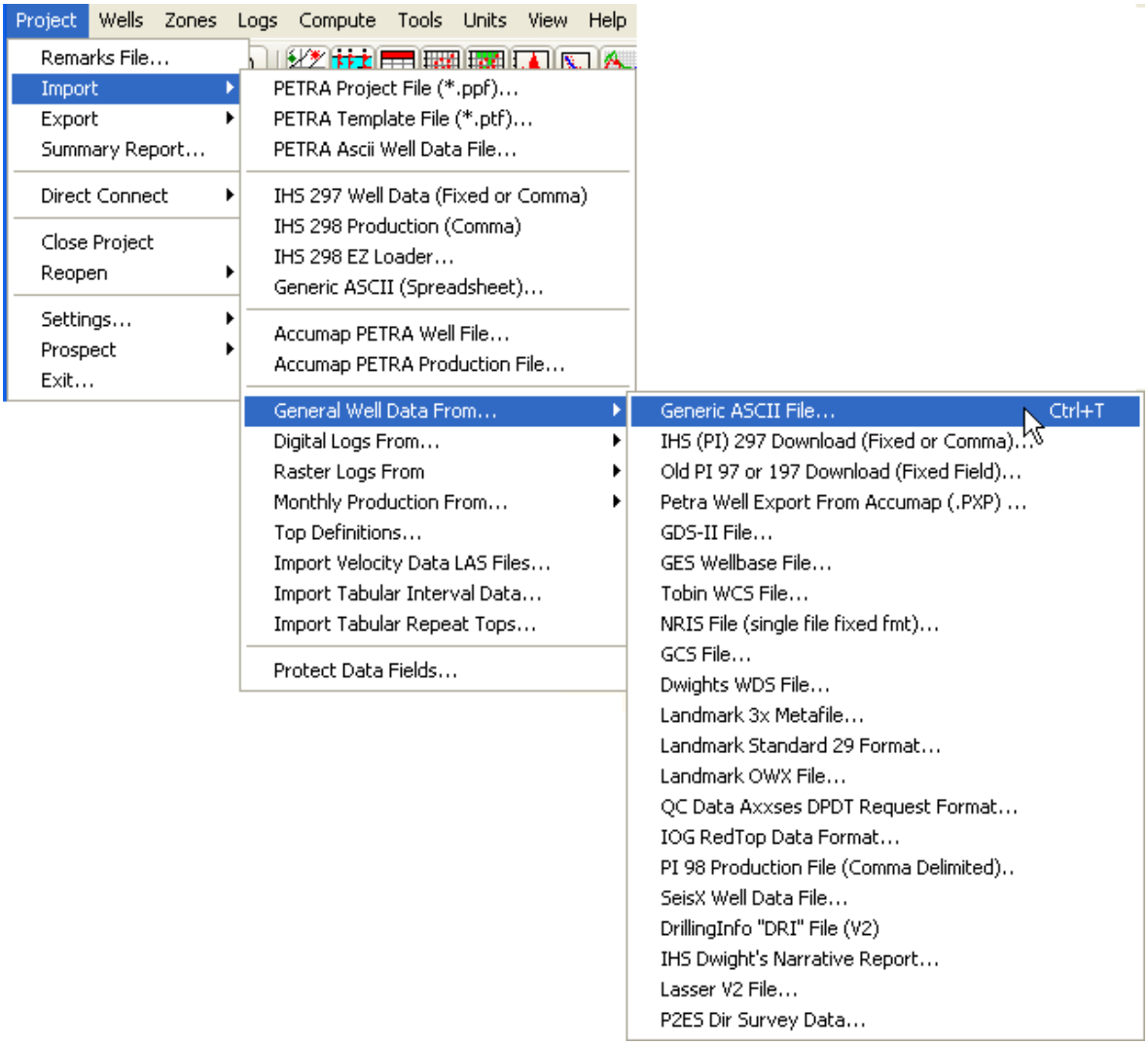
Importing tabular ASCII well data

On the Main Screen, under the Project Menu, there is an Import option for bringing data into PETRA. One of the many options under the General Well Data From… menu item is the Generic ASCII File... option, sometimes referred to as a Spreadsheet file.

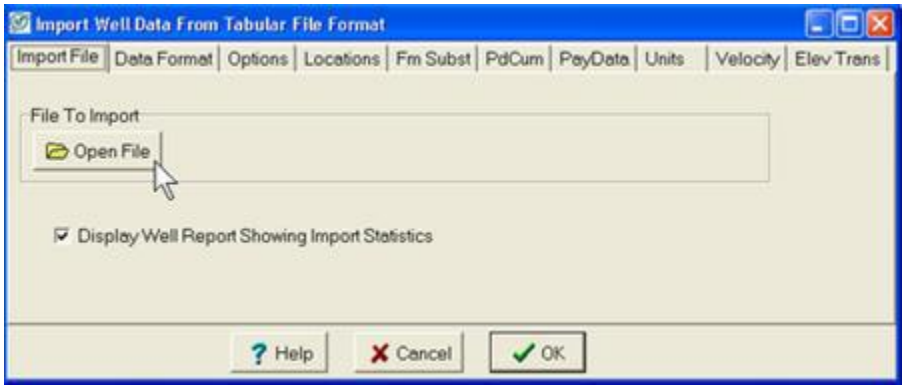
Note: Excel spreadsheets (.xls files) are not loaded into PETRA; however you can save an .xls file out as a comma separated variable .csv file or a space delimited text file from your spreadsheet program. Do not save as a *tab delimited* file. PETRA does not load *tab delimited* files.

ASCII well data files contain data fields in columns, similar to a table or spreadsheet. PETRA can import files containing more than one record per well; however, all wells must contain the same number of records. Header records or column identifiers can be skipped over, if necessary. One column must contain the UWI or API number. Other data columns can contain well header information, such as well name, operator name, producing formation, etcetera. In addition, data columns can be imported into any of the project's zone data items or formation tops.

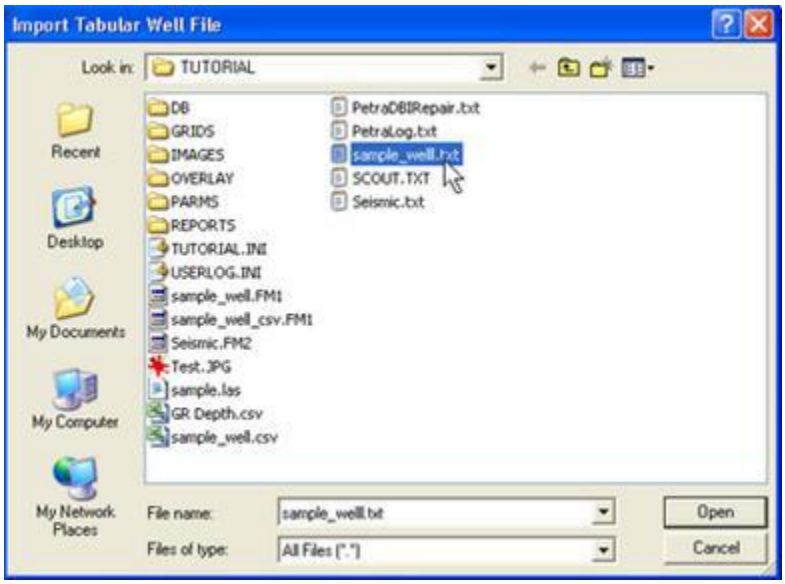
1. Select the **Project→Import→General Well Data From…→Generic ASCII File** main menu.
2. Click the **Import File** tab, and then click the **Open File** button and select the sample_well.txt file located in the ...\Geoplus1\Projects\Tutorial folder.


Project
Wells
Zones
Logs
Compute
Tools
Units
View
Help
Remarks File...
Import
Export
Summary Report...
Direct Connect
Close Project
Reopen
Settings...
Prospect
Exit...
PETRA Project File (*.ppf)...
PETRA Template File (*.ptf)...
PETRA Ascii Well Data File...
IHS 297 Well Data (Fixed or Comma)
IHS 298 Production (Comma)
IHS 298 EZ Loader...
Generic ASCII (Spreadsheet)...
Accumap PETRA Well File...
Accumap PETRA Production File...
General Well Data From...
Digital Logs From...
Raster Logs From
Monthly Production From...
Top Definitions...
Import Velocity Data LAS Files...
Import Tabular Interval Data...
Import Tabular Repeat Tops...
Protect Data Fields...
Generic ASCII File... Ctrl+T
IHS (PI) 297 Download (Fixed or Comma)...
Old PI 97 or 197 Download (Fixed Field)...
Petra Well Export From Accumap (.PXP) ...
GDS-II File...
GES Wellbase File...
Tobin WCS File...
NRIS File (single file fixed fmt)...
GCS File...
Dwights WDS File...
Landmark 3x Metafile...
Landmark Standard 29 Format...
Landmark OWX File...
QC Data Axxses DPDT Request Format...
IOG RedTop Data Format...
PI 98 Production File (Comma Delimited)..
SeisX Well Data File...
DrillingInfo "DRI" File (V2)
IHS Dwight's Narrative Report...
Lasser V2 File...
P2ES Dir Survey Data...

3. Click the **Open File** button to locate the data file to load into your project.



4. Select the sample_well.txt file located in the ...\Geoplus1\Projects\Tutorial folder.



5. Click the **Data Format** tab. When PETRA opens the file the first two data records are displayed in a scrollable box in the Data Record section of the Data Format screen.

The start and end column position and record number identify each column of data to be imported. The columns can be selected from the lower data record by swiping the column using the mouse. Swiping is accomplished by clicking the left mouse button at the starting position of the column.

1. While holding the left button down, drag the mouse to the end column of the field and release the left mouse button.

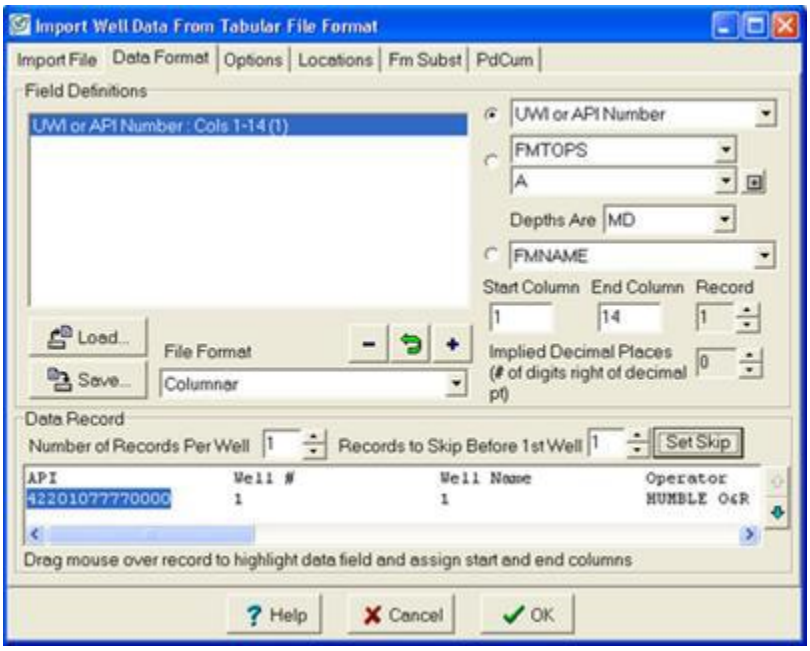
   The Start Column and End Column fields show the columns containing the data.

2. Associate the selected column with either a well header or zone data item from one of the two drop down lists.

3. Add the associated column to a list of Field Definitions by clicking the **Add** button.

4. Because there is a header record in the data file, you need to tell PETRA to skip the header record when the data is loaded. Click the first actual data record, and then click the **Set Skip** button.

There are over 200 predetermined data items that can be entered into your project using the upper most drop-down data item list. Additional data items (numbers, dates, text strings) can be defined by the user.

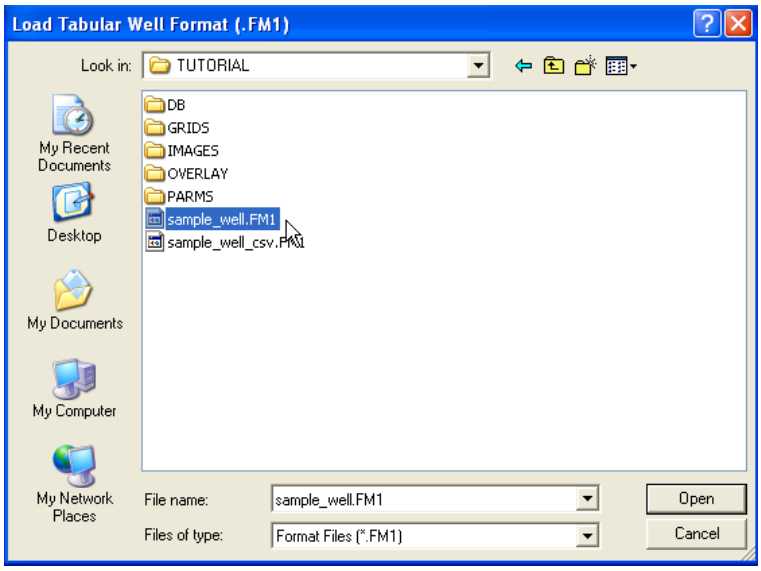


A format file for the sample_well.txt has been provided to show the data items and associated columns the data is located in.

To load the format file

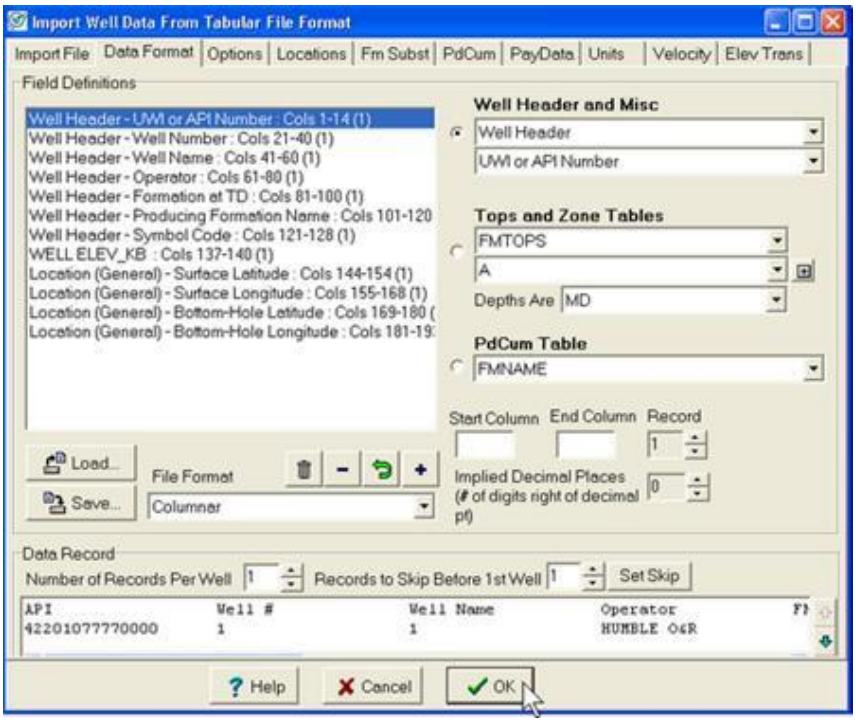
1. Click the **Load...** button, and select the sample_well.FM1 file.

   This file is located at the root of the Tutorial project.

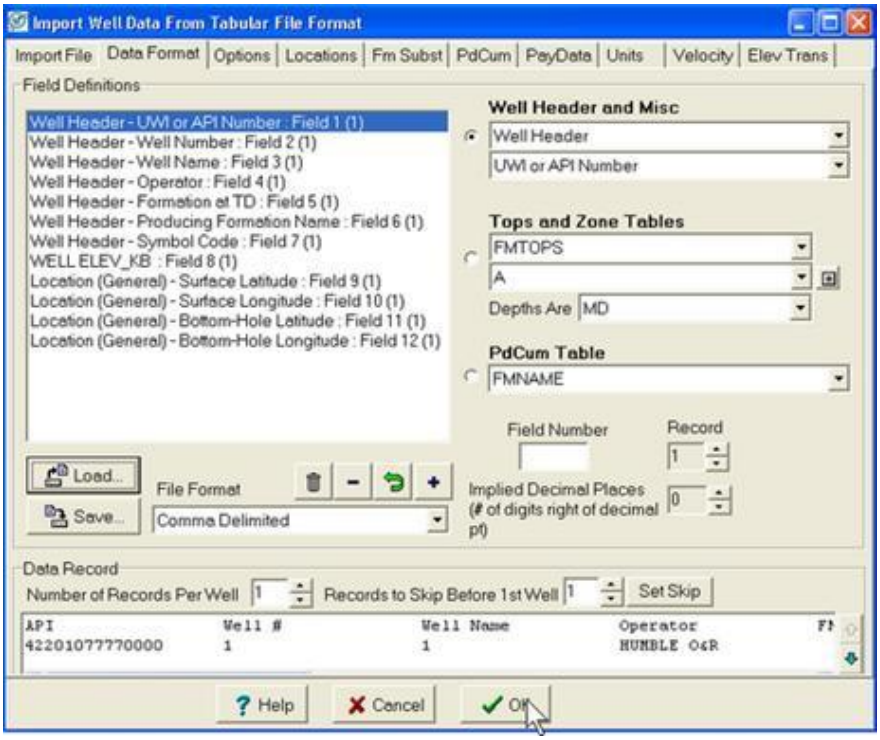


2. Click the **Open** button.

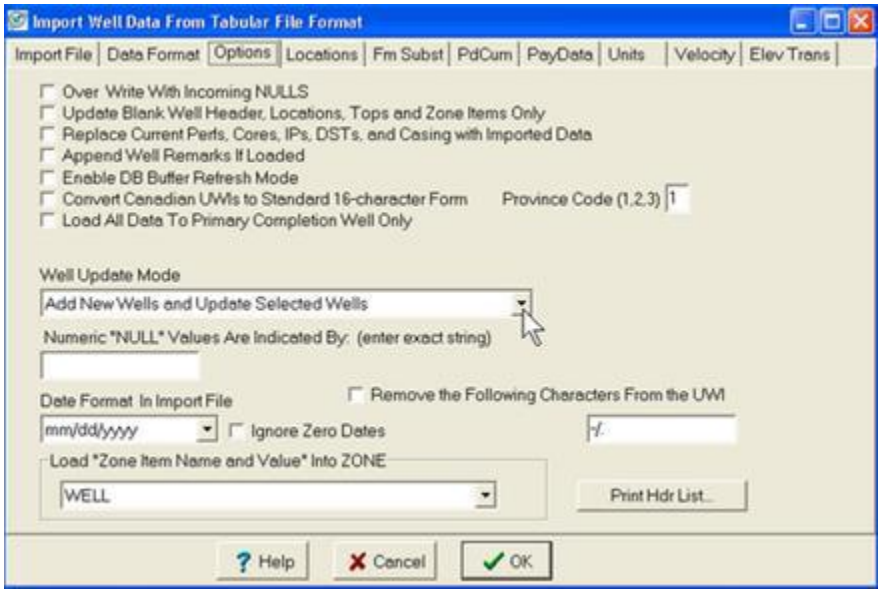
   You see the data items and associated data columns that have been defined for the input data file. Once you have selected the data items and columns for the file that you are loading, you can create a template file to be used for another file that contains the same data items located in the same columns.



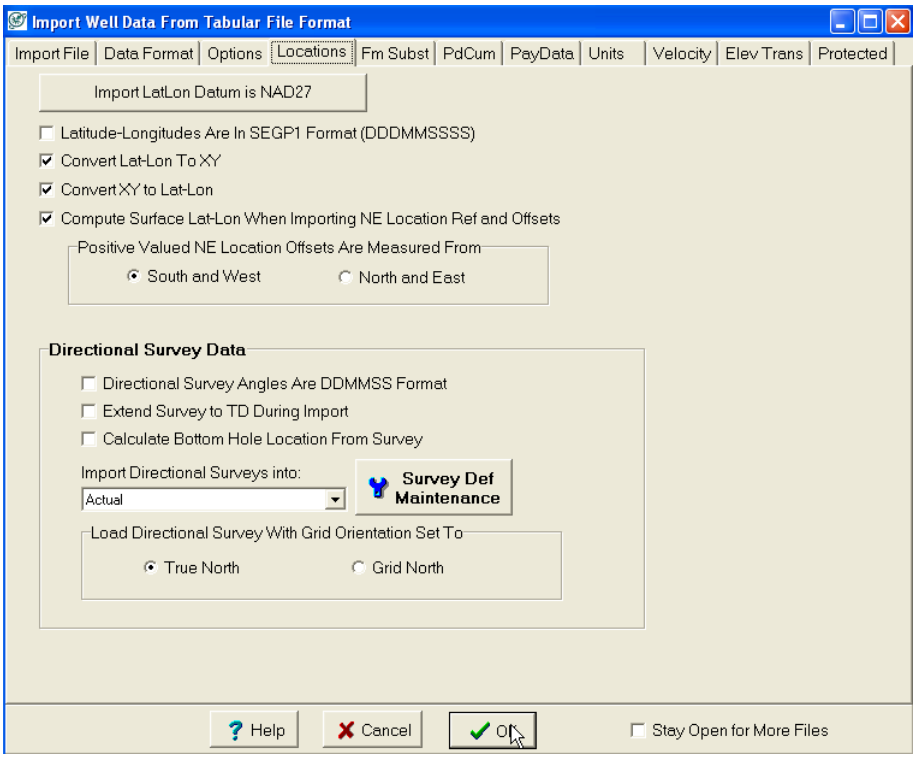
Data can also be loaded from a .csv file. Instead of columns, the data items are defined as a Field Number instead of defined columns. An example file called sample_well.csv is located in the ...\Geoplus1\Projects\Tutorial folder. The format file is called sample_well_csv.FM1 and is located in the same directory.



1. Click the **Options** tab to observe the options that are available when importing data from a tabular file. For this exercise, we can accept the default to Add New Wells and Update Selected Wells.



2. Click the **Locations** tab to observe the options that are available when importing locations from a tabular file.



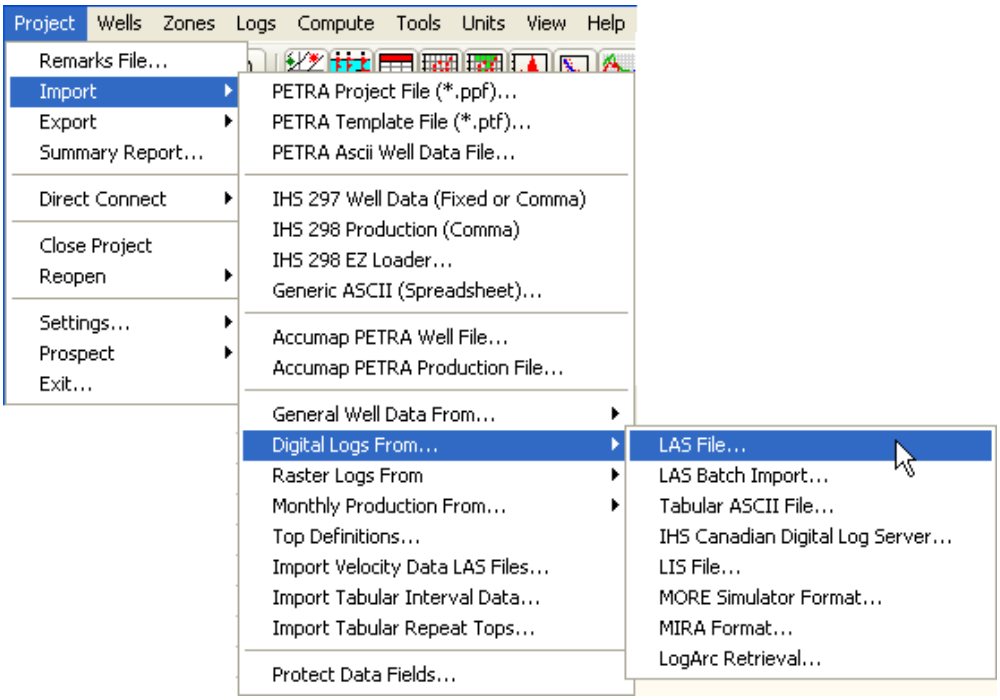
3. Finally, after all columns are selected and the appropriate options are chosen, click the **OK** button with the green check

to initiate the import process.

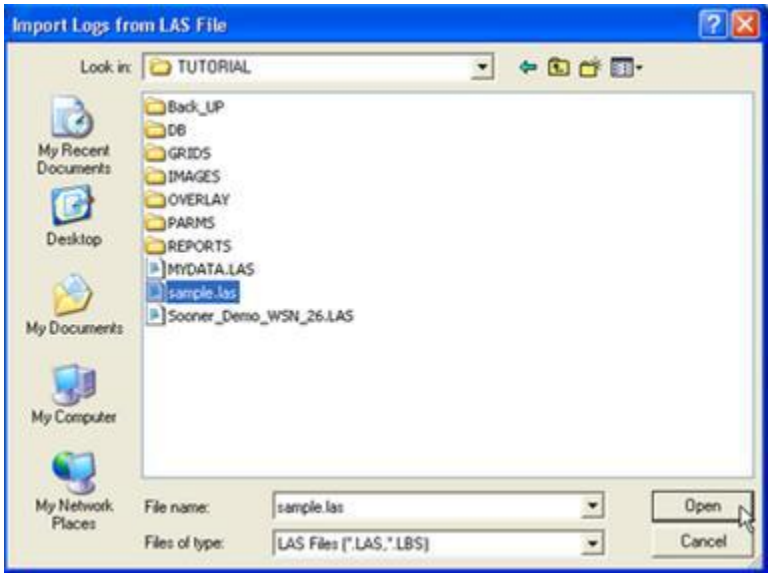
Importing digital log data – LAS data

You can import digital well log data from industry standard LAS formatted files.

1. Select the **Project→Import→Logs From→LAS File** menu option on the main screen to import a LAS file.



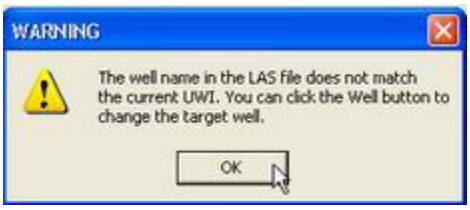
2. Choose the **LAS file** from the ..\Geoplus1\Projects\Tutorial directory called sample.las.



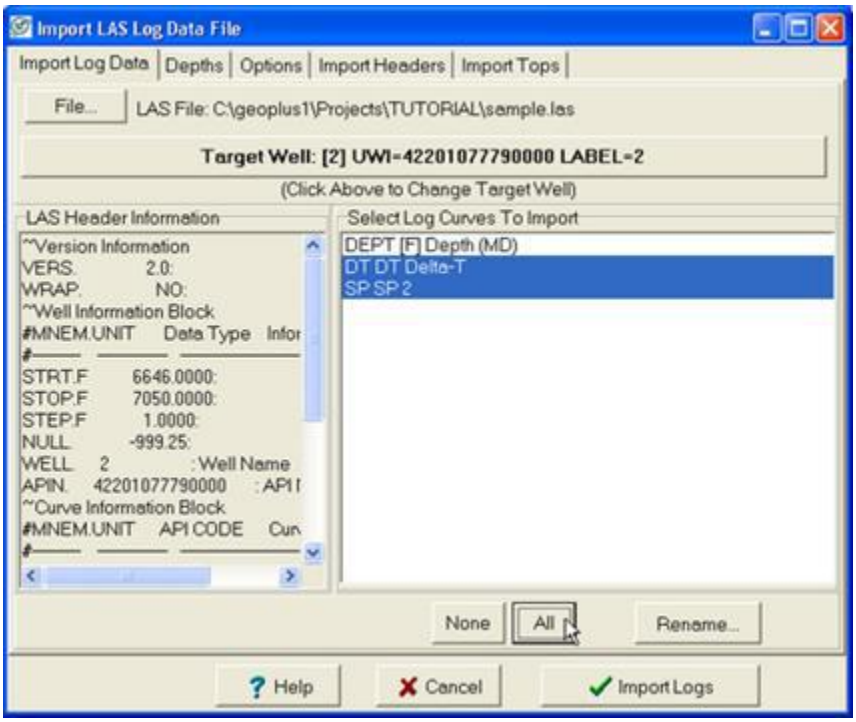
Since LAS files contain log data for a single well, PETRA attempts to match the currently selected well with the header records of the selected LAS file. If the currently selected well is not the well that is in the .LAS file, the following ***Information*** dialog box is displayed, if the well exists in the project.

Information
The LAS file matched a well other than the default well.
Please verify that the "Target" well is the correct well.
OK

You receive a ***WARNING*** message if a match cannot be found in the project to the UWI/API that is in the .LAS file. In this case, use the Target Well button to select the well that you want to load the LAS logs into, or select a file that contains the UWI/API for the well in the project that the curves need to be loaded into.


WARNING
The well name in the LAS file does not match the current UWI. You can click the Well button to change the target well.
OK

For the sample.las file, the well is in the project and is automatically selected as the Target Well.



The LAS Header Information lists all identifying data from the LAS file header records. The log curves, available for loading, are listed in the Select Logs To Import section.

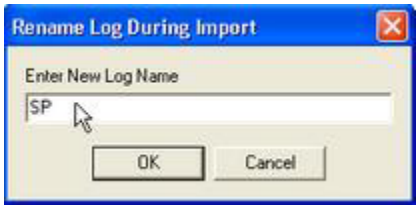
Click to highlight the logs you want to import or click the All button to select all of the curves in the file and click the Import Logs button with the green check. The DEPT log contains the depths for the curves and is not a curve that is to be imported.

Log curves can be imported under a different name from the one specified in the LAS file. LAS logs can be renamed as they are imported. To rename a log

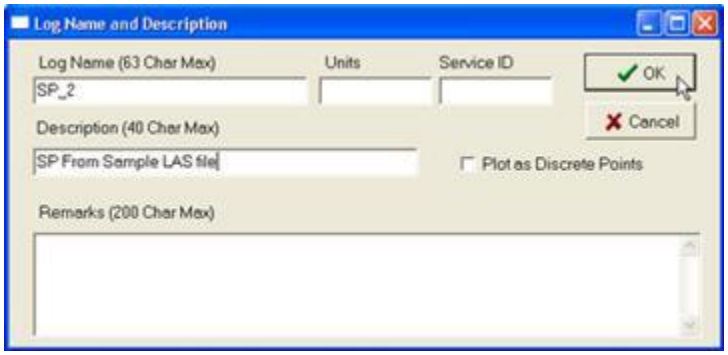
1. Click to highlight the log name in the Select Logs To Import list.
2. Click the **Rename**

button and type the new log name.

   If the new log name does not already appear in the log database, you are prompted for the new log name's units and description. The new name is added to the log definitions, even if no data is ever loaded.
3. After entering the New Log Name, click **OK**.

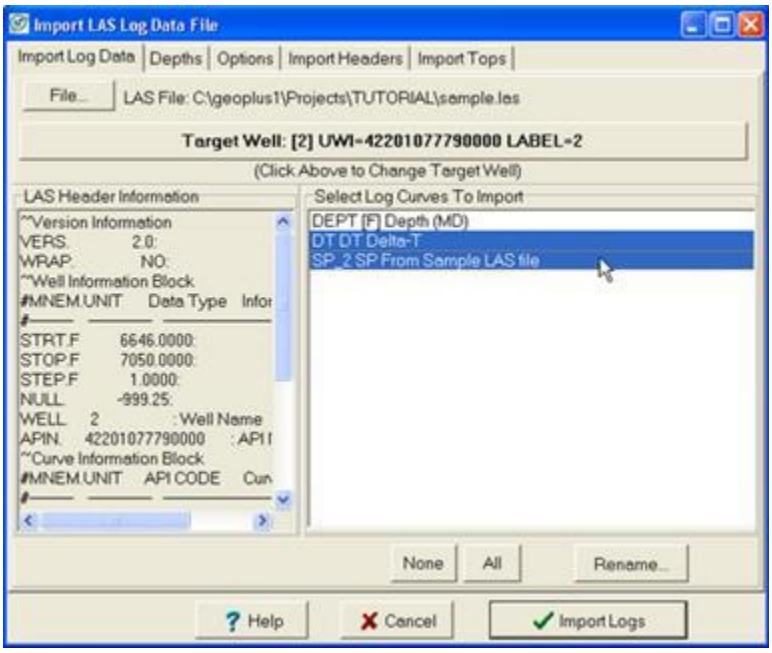


4. Enter the Description for the new log name.

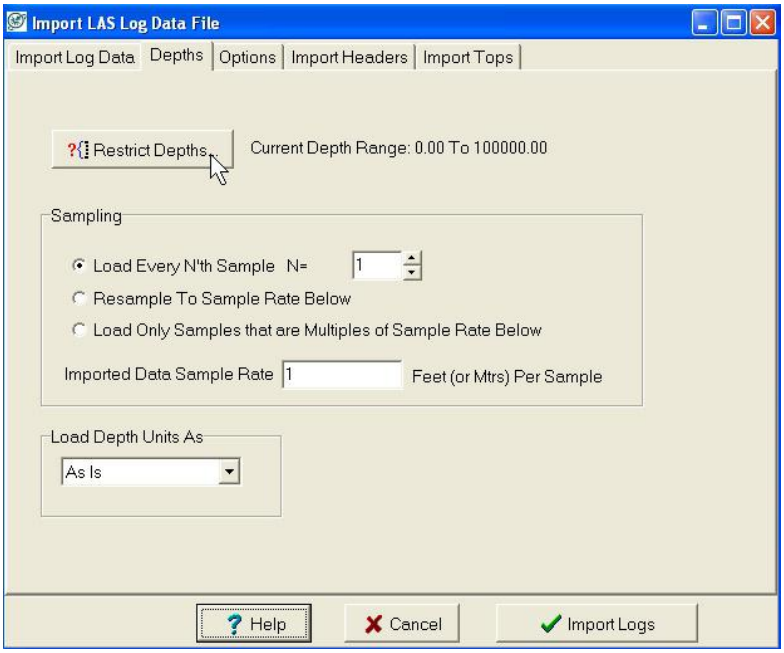


   The curve name on the ***Import LAS Log Data File*** dialog screen is changed to the new name.
5. Reselect the curve by holding down the Ctrl key and click the new curve or click **All**

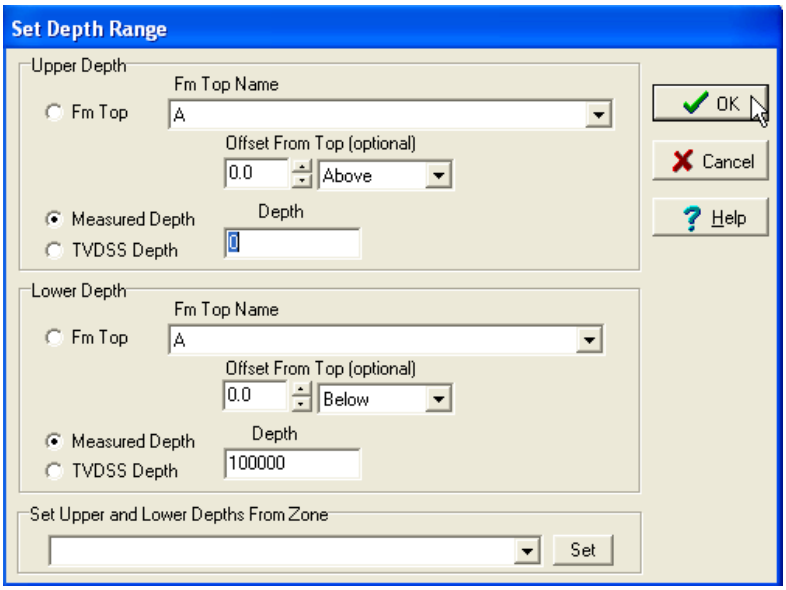
again to reselect all of the curves.



6. Click the **Depths** tab.



7. Click the **Restrict Depths** button to display the ***Set Depth Range*** dialog screen as shown below.



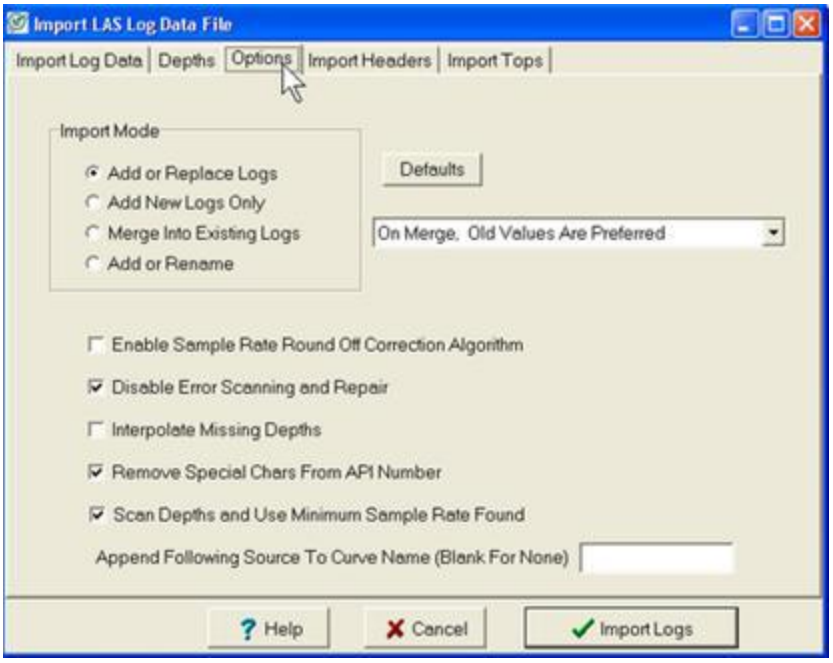
The depth range screen allows the upper and lower depths of an interval to be defined using either a constant depth value (Measured Depth or TVD Subsea Depth) or variable depth based the formation tops.

FM Top and Offset From Top: This option allows the depth interval to vary from well to well based on the values of the formation tops.

1. Select the formation top reference from the drop-down list and optionally set a numeric offset value. The offset provides for such intervals as 100 feet above and below a given top.
2. Accept the defaults.
3. Click the **OK** button with the green check

to close the Set Depth Range dialog.

   You can decimate the log data as it is imported by loading every n_{th} depth sample. Set the N= field to 1 to load all samples. Set the value to 2 to load every other sample, 3 for every 3_{rd} sample, and so on.
4. Click the **Options** tab.



The Radio button options are

- **Add or Replace Logs** — simply adds the log if no other log with the same name for the well exists or replaces the current database log if one already exists.
- **Add New Logs Only —** does not over write existing data and only stores the imported log if another log with the same name for the well does not exist.
- **Merge Into Existing Logs —** adds the log if it does not exist and merges itself with any existing log of the same name. Use the merge option to combine multiple runs of the same logs over different depth ranges.
- **Add or Rename —** adds the log if no other log with the same name for the well exists. If there is a log with the same name, the incoming log is renamed with a _1 appended to the existing name to give it a new name.

The check box options are

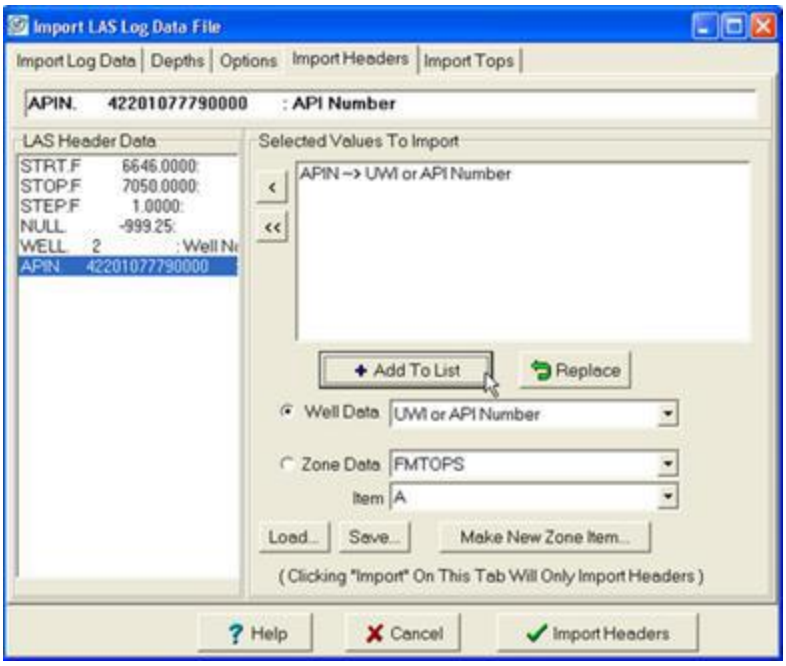
- **Enable Sample Rate Round Off Correction Algorithm** — corrects for depth round off errors caused by a sample rate (step) value that is an irrational number such as 0.1524 — for example, log data digitized with a sample rate of 0.5 feet, and then writes to a LAS file as meters may cause round off errors in the depth values depending on the algorithm used by the data supplier or digitizing company. PETRA can correct round off if you select to load the entire depth range of curve data and the data has no missing depths. Click the **Enable Sample Rate Round Off Correction Algorithm** check box to activate this option.

- **Disable Error Scanning and Repair** — scans for potential bad characters in the curve data and looks for data that is not space delimited. These conditions are corrected if this option is checked.
- **Interpolate Missing Depths** — interpolates values over the missing intervals if the LAS file includes gaps in the depths.
- **Remove Special Characters From API Number** — removes any non-numeric value from the API number in the LAS file. Embedded blanks are converted to underscores prior to matching wells in the database.
- **Scan Depths and Use Minimum Sample Rate Found** — scans the depths and determines the minimum sample rate if this option is checked.
- **Append Following Source To Curve Name (Blank For None)** — allows you to add a source to the curves being loaded.

You can import information from the LAS Header Data.

1. Click the **Import Headers** tab.
2. Highlight the item in the LAS Header Data column.
3. Select the appropriate item from the Well Data drop-down list or from the Zone Data drop-down list.
4. Click the **Add To List** button.
5. Click the **Imports Headers** button with the green check.

   See the following example of importing information from the LAS Header Data.



If there are tops in the LAS file, they can be loaded by clicking the Import Tops tab. Select the tops and click the Tops button with the green check. The tops are be loaded into the database. There are no tops in this sample file.

6. Click the **Options** tab and click the **Import Logs** button to begin importing the log curves.

   After the curves are loaded, the following confirmation message is displayed. If you have another LAS file to import, you can click the **Yes** button and import the log data for the next well. For our exercise, click the No button.

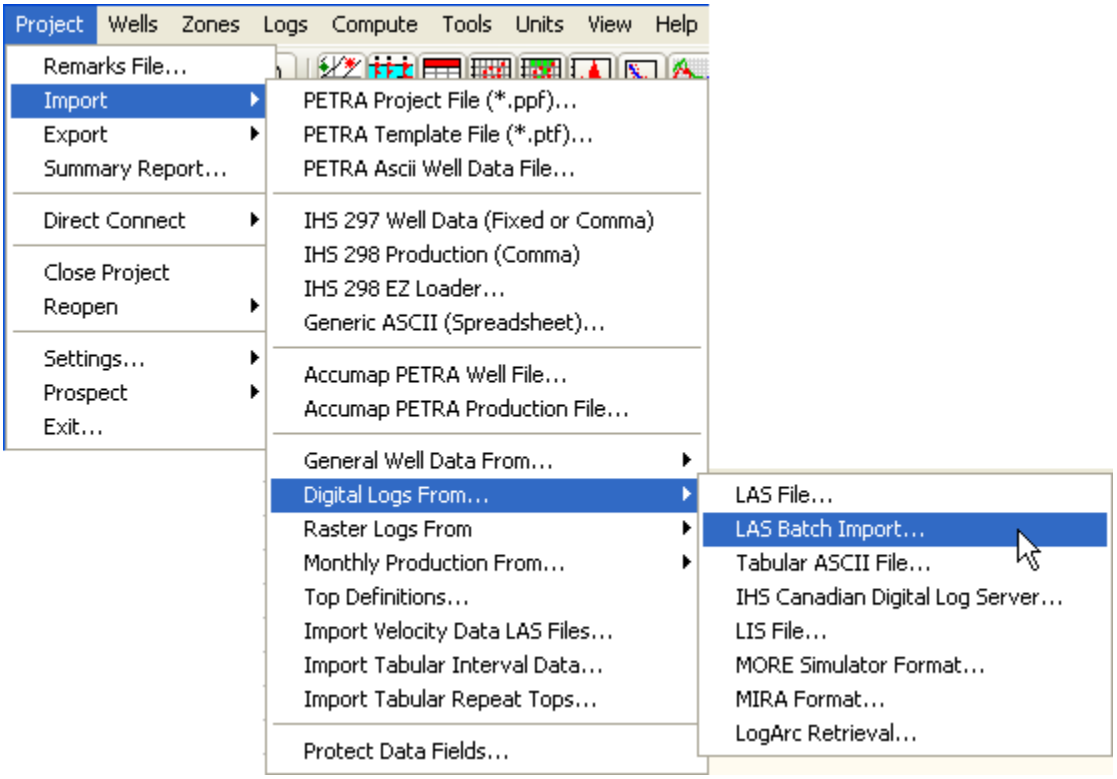
7. Navigate to the **Logs** tab and click the **Refresh Data From Disk** icon to get the latest list of logs for the well.
8. Click **WSN 2.**
9. Click the **Logs** tab.

10. Click a log to highlight it or hold the Ctrl button and left click to select more than one log curves.

11. Click the **Log Preview** button to view the selected logs.

LAS batch import

You can import more than one LAS file at one time by using the Import Logs From...→LAS Batch Import... menu.

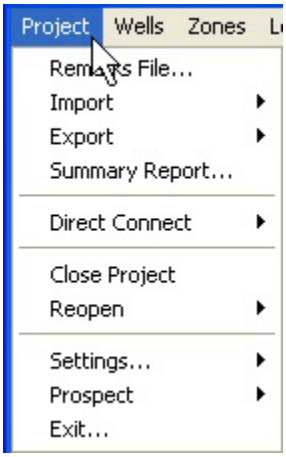


1. Click the **Explorer...** button or the **Browse...** button to locate your LAS files.
2. Select all of the LAS files that you want to load at one time, and then click **Open** button.
3. After you select the LAS files, review the Options tab and Depth tab to set the parameters that you want to use.
4. After you choose the options for this import, click the **Import Logs** button to begin importing the log curves.

The import batch process cycles through each of the LAS files until all of the files have been processed.

Project Menus

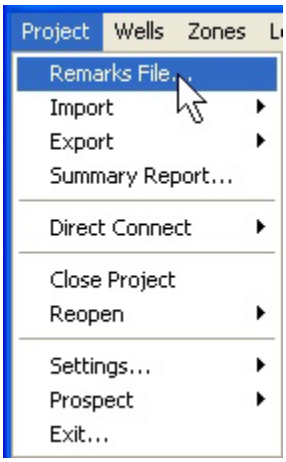
There are many settings you can use to customize your project. First, click the **Project** menu in the Main module. The Project menu is located in the upper left hand corner of the Main screen.

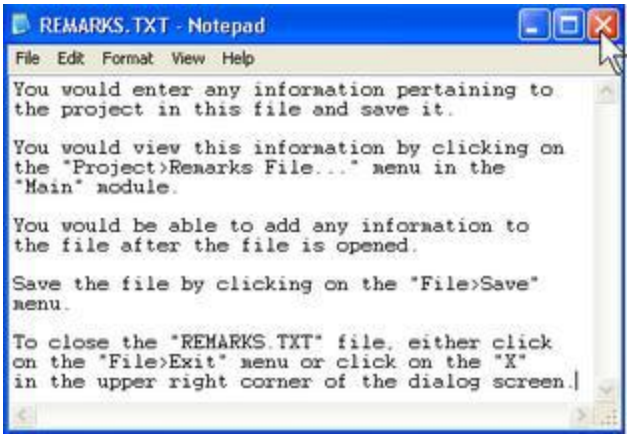


Then select any of the following options to customize your project.

Project>Remarks File menu

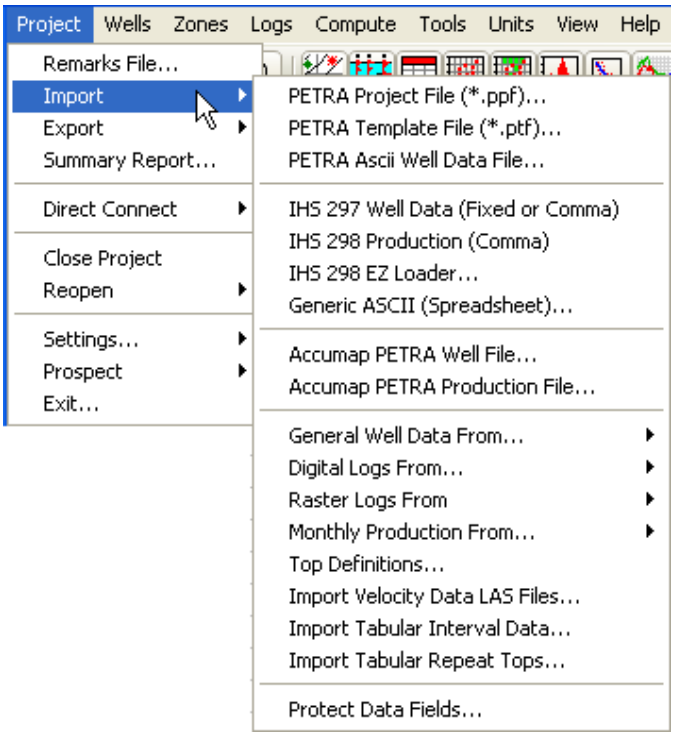
The Remarks File... option uses Notepad to open a file where you may store any ASCII information about the Project. The file is named REMARKS.TXT and is located in the PARMS folder for the project.




REMARKS.TXT - Notepad
File Edit Format View Help
You would enter any information pertaining to the project in this file and save it.
You would view this information by clicking on the "Project>Remarks File..." menu in the "Main" module.
You would be able to add any information to the file after the file is opened.
Save the file by clicking on the "File>Save" menu.
To close the "REMARKS.TXT" file, either click on the "File>Exit" menu or click on the "X" in the upper right corner of the dialog screen.

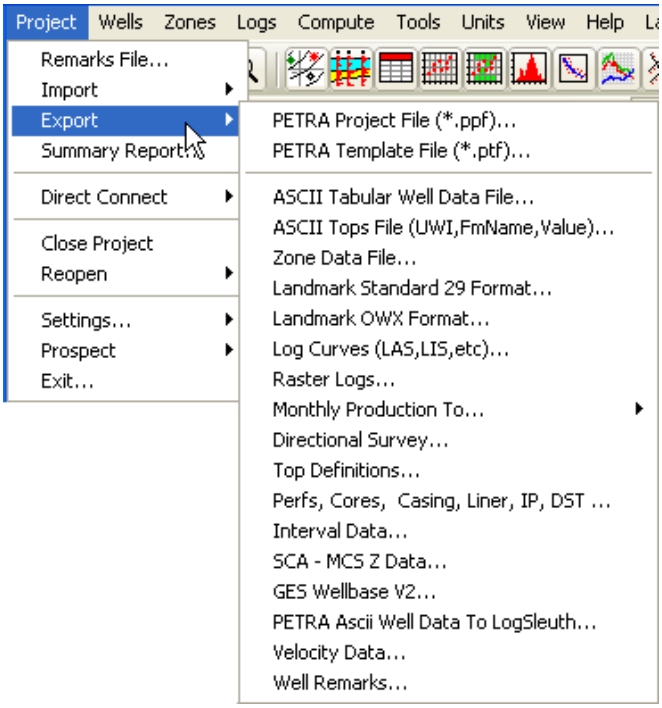
Project>Import menu

Use the Import option to load data for the project. There are many options for importing data, and those options are discussed in detail in the various sections of the manual where data loading is mentioned.



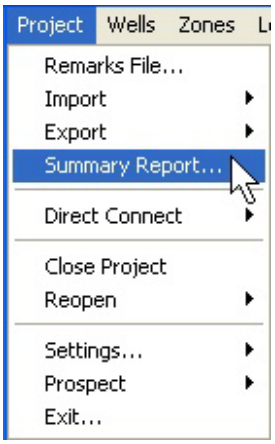
Project> Export menu

Use the Export option to create a PETRA Project File (*.PPF) or a PETRA Template File (*.PTF). Data from the various tables can be exported as well. There are options to create an ASCII Tabular Well Data File, an ASCII Tops File, a Zone Data file, two Landmark files, Log Curves, Raster Logs (TIF files) and LIC files from the current project to a selected file folder, Directional Survey Data, Top Definitions and a SCA – MCS Z Data, GES Wellbase V2, and PETRA ASCII Well Data to LogSleuth. Monthly Production Data can be exported as a Tabular file, a Production Analyst file, or a More Simulator Recurrent Data file.



Project> Summary Report…menu

Use the Summary Report option to create a summary report of the project.

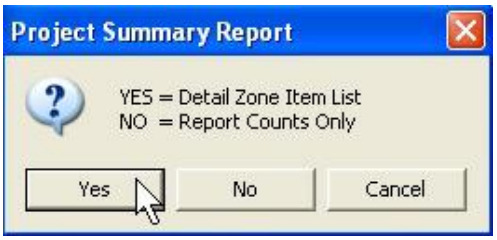


There are two types of summary reports that can be generated for the project.

When you select the **Project>Summary Report….** option, you then see two options:

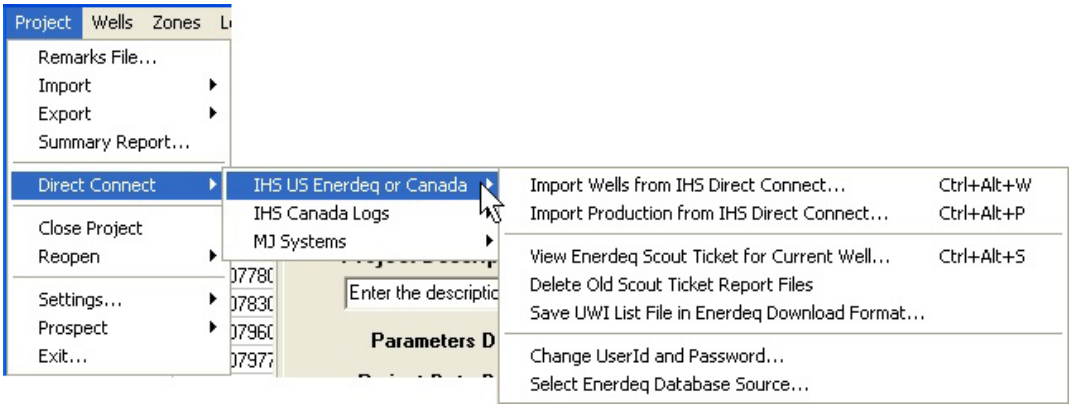
- Details Zone Item List
- Reports Counts Only

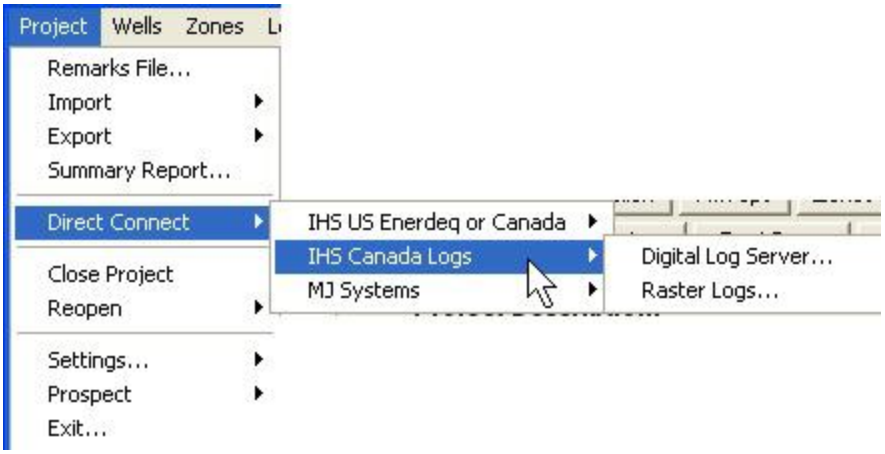
Click the **Yes** button to select Details Zone Item List or click **No** to select Reports Counts Only. Click the **Cancel** button to cancel the selection.



Project> Direct Connect menu

To use any of the Direct Connect options, you must meet certain requirements.



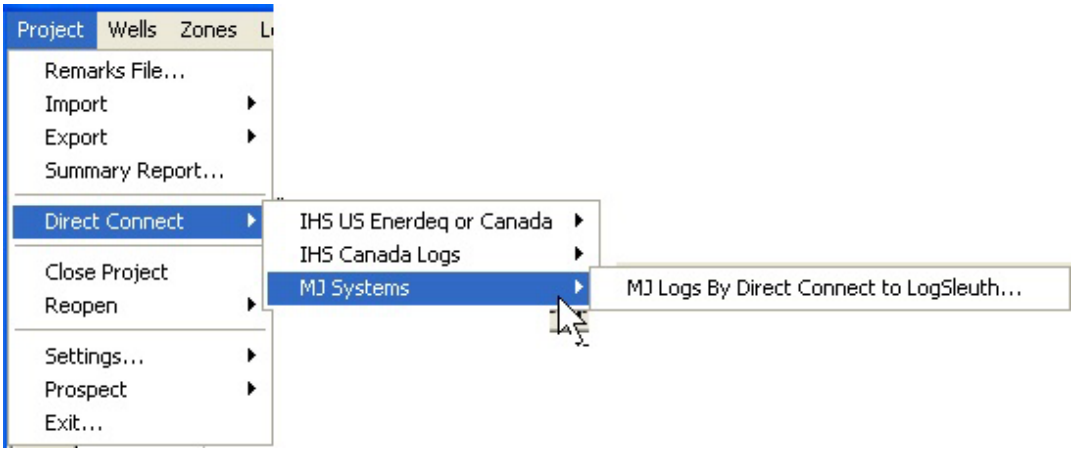


The requirements for the Project>Direct Connect>IHS US Enerdeq or Canada option or the IHS Canada Logs option are

1. Subscribe to Enerdeq and have a Userid and Password.
2. Have authorization to get into Direct Connect.
3. Have 3.2.1.0 (May 18, 2007) or later version of PETRA installed.

Note: Keep in mind that Subscriptions to Enerdeq can be limited to specific areas.

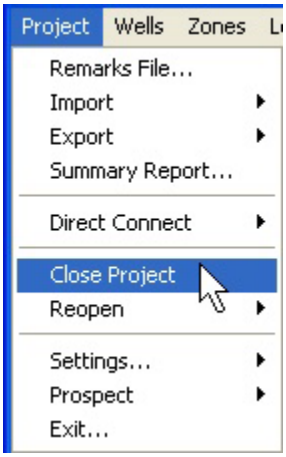
When you click on the **Project>Direct Connect>MJ Systems** menu option, you have requirements to meet.



1. MJ's LogSleuth has to be installed.
2. You must be a subscriber to MJ's log database.

Project>Close>Project menu

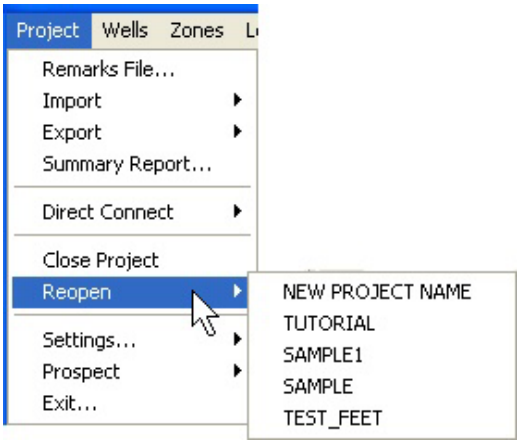
Use the Close→Project menu to close the current project while keeping PETRA open and retaining your license.



You can also use the Close The Current Project icon in the Main module.

Project>Reopen menu

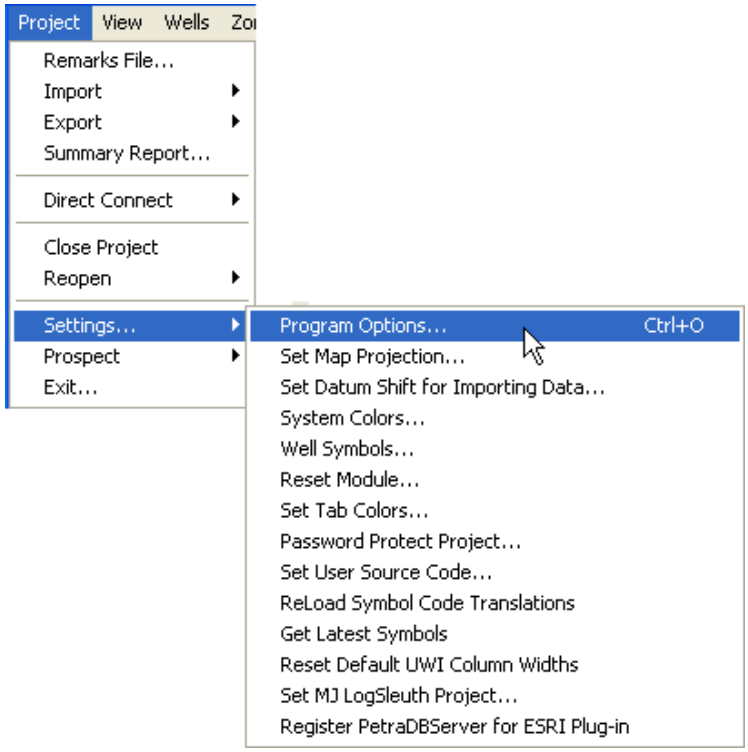
The Project→Reopen menu option displays the last five projects that have been opened. With the left mouse button, click the project that you want to open.



Project>Settings menu

Use the Project→ Settings… menu to customize your project by setting the Map Projection and various options in Program Options.... You can password protect your project, reset a module that may have some problems, set the MJ LogSleuth Project, etcetera.

Customize the settings for the current project by clicking on the Main module's **Project→ Settings→ Program Options** menu.



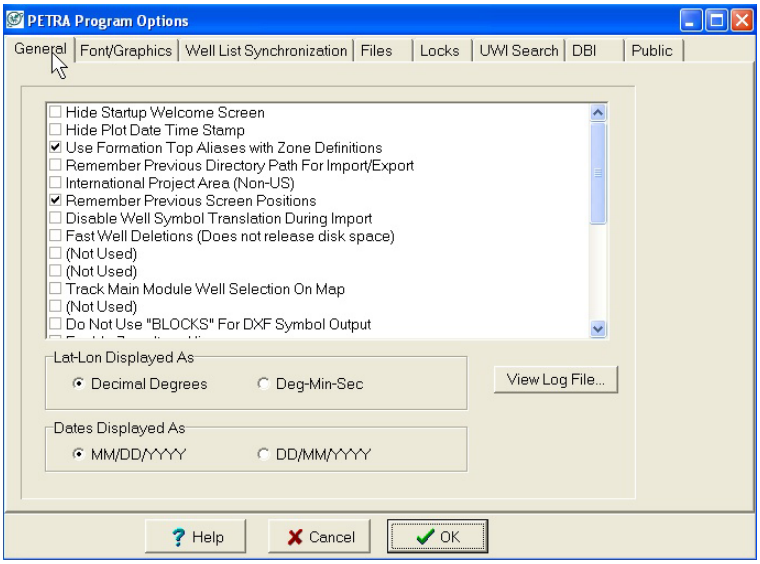
The ***PETRA Program Options*** dialog box opens showing the following tabs:

General, Font/Graphics, Well List Synchronization, Files, Locks, UWI Search, DBI, and Public

General Tab

Project→ Settings→ Program Options - General Tab

The ***PETRA Program Options*** dialog screen is shown with the defaults for a new project checked. A brief description is given for each option.



- **Hide *Start up Welcome* Screen** — PETRA does not display the ***Welcome*** screen when this option is checked, which allows you to open the previously accessed project, open an existing project, or create a new project. Instead, PETRA displays the main screen in the closed project state. You may then open or create a project using the menus or speed buttons.

- **Hide Plot Date Time Stamp** — By default, PETRA plots a small label in the lower left corner of all printed graphics showing the date and time the output was produced. Use this option to enable or disable the date-time stamp.

- **Use Formation Top Aliases with Zone Definitions** — This option is set as a default and determines whether or not to apply top aliases when converting a zone interval to depths.

- **Remember Previous Directory Path For Import/Export** — This option is set as a default when a new project is created. Each time a file is imported or exported, PETRA repositions the file chooser dialog to the previous directory path. Since the Sample and Tutorial projects were created prior to the current default settings, you need to click in the check box Remember Previous Directory Path For Import/Export to turn this option on.

- **International Project Area (Non-US)** — With this option set, the Main, Well and Location tabs are altered to not show US state-county and location buttons.

- **Remember Previous Screen Positions** — This option is set as default when a new project is created. If your project was created under an older version of PETRA, as the Sample and Tutorial projects were, then set this option to have the dialog screens stay in the previous location on the screen after moving them. This is particularly useful with dual monitors. Your display comes up on the last screen you used for that module. When a screen is set to a desired size, that size and position is remembered as well.

- **Disable Well Symbol Translation During Import** — The SYMTRANS.DEF file is used to translate well symbol codes during data import. For example, a PI symbol code of 2GAS is translated to simply GAS in the database. Use this option to disable such translation. You must have a Symdesc.usr file with the symbol codes defined in the file.

- **Fast Well Deletions** — Turn on this option if you want to delete wells very fast. Otherwise, PETRA must process all database tables and delete all records associated with the deleted well. The only drawback to using fast deletion is that compressing a database does not release the unused space. If you are using the DBI database engine, the PetraDBIRepair.exe utility has an option to Pack the tables. This removes the orphaned records and removes any unused space in the tables.

- **Force DB Buffer Refresh** — This option disables the caching or buffering of database table updates. Importing data can be slower with this option enabled.

- **Track Main Module Well Selection On Map** — Check this option to have the Map module highlight the well that is chosen in the Main module. This feature works best with dual monitor setup where you have Main displayed on one screen and Map displayed on another.

- **Dynamic Open/Close of Raster Log Tables** — When this option is checked, the raster log database buffers or caching is refreshed with each access. This option may cause slower performance.

- **Do Not Use BLOCKS For DXF Symbol Output** — This option is used by the Print To DXF File function. When checked, the exported DXF file does not use blocks to create the well symbols. Instead, each symbol is drawn in detail.

- **Enable Zone Item Aliases** —Zone data item aliases are enabled when this option is checked. Zone item aliases perform like formation top aliases, allowing multiple sources of equivalent zone items to be searched based on a prioritized list.

- **Disable Use Of Map Projection Convergence Angle For Directional Wells** — With this option checked, deviation surveys are not rotated to correct True North to Grid North. This option is normally left unchecked and the decision to rotate or not rotate is set for each well individually from the Directional Survey Data options.

- **Use Public Parms Folder for Template Files** — Use this to control the default folder used when saving/loading various template files — either the Private or Public Parms folder can be used.

- **Suppress Save Prompt in Main** — Check this option to suppress the prompt you receive when changing between wells or tabs after changing data. Changes are saved automatically.

- **Use Buttons on Main Tab** — Use this option to display the data tabs with a button style instead of the normal tabs. With buttons, it is sometimes easier to see which tab you're on.

  Displayed as buttons.

  Displayed as tabs.

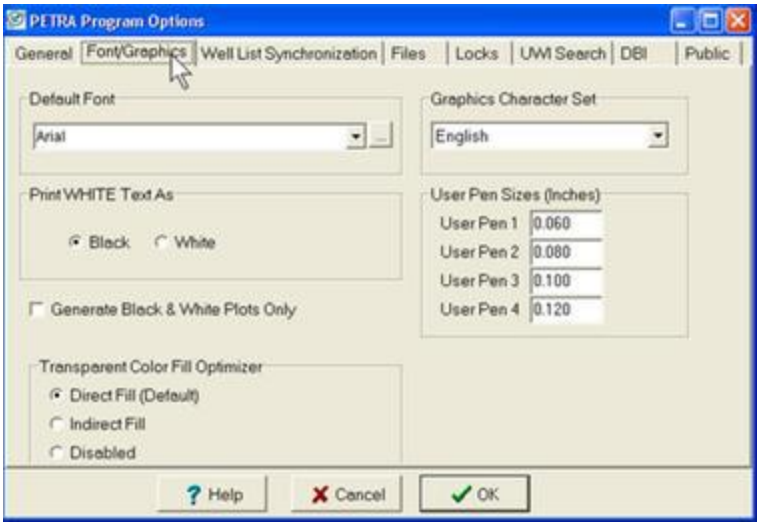
Radio Button Options at the bottom of the PETRA Program Options dialog screen are

- **Lat-Lon Displayed As** — Decimal degrees or Deg-Min-Sec. For example, you choose how you wish to have latitude and longitude values displayed. Decimal Degrees display as 25.00325, -95.34054, Deg-Min-Sec display as 25:00:11.7 and -95:20:25.95. Note: you may enter lat-lon values by typing in either format.
- **Dates Displayed As** — Choose the display of the date files: MM/DD/YYYY or DD/MM/YYYY.
- **View Log File...**

— Use this button to display information about the project — map projection changes, overlay file(s) saved, seismic lines deleted, etcetera. The information is contained in a file called PetraLog.txt located at the root of the project folder.

Font/Graphics Tab

Project→ Settings→ Program Options - Font/Graphics Tab



The options here are used to set the default font to one of the available fonts in Windows. The Graphics Character Set can be changed to one of the character sets that has been installed on the machine. For example, Russian can be chosen, rather that the default of English.

There is an option that can be set to Print White Text as Black, which is the default, or to White.

The option, Generate Black & White Plots Only, is used to force all plotting to be black and white.

The User Pen Sizes (Inches) option allows for four additional pen widths when an option is available for changing the Line Thickness. The widths that are set as the default are thicker than the Narrow, Normal, Wide, and Extra Wide options.

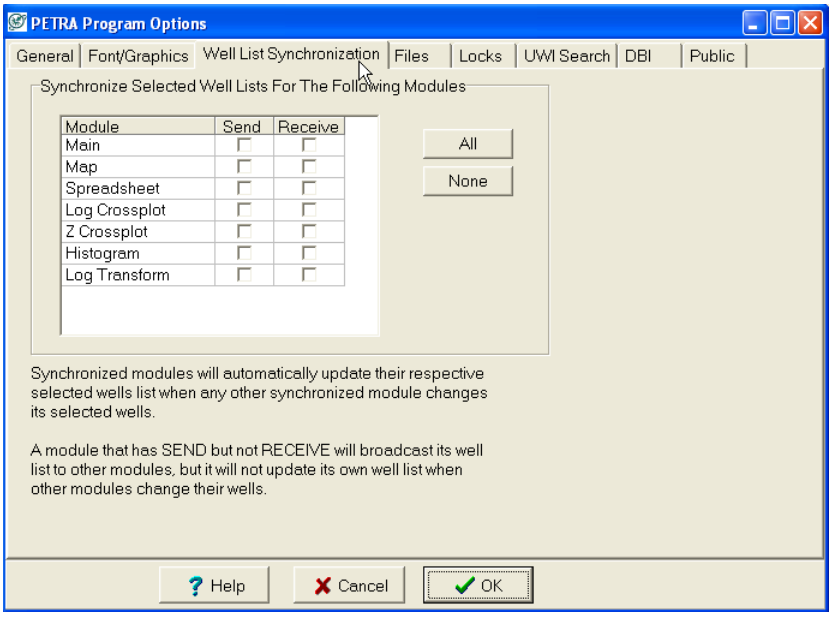
The Transparent Color Fill Optimizer has 3 options. Direct, which is the default, Indirect Fill, and Disabled to disable the transparent color fill.

This option controls how transparent color fill on top of raster log images is handled by plotter drivers. Some plotter drivers cannot transparent fill directly, so PETRA has alternative methods to generate the fill. The Direct Fill method must be used whenever possible. If problems arise in cross-section raster log pay intervals or tops shading, first try the Indirect Fill method, and if that does not work, use the Disabled method.

Note: When the optimizer is disabled, plot files become significantly larger.

Well List Synchronization Tab

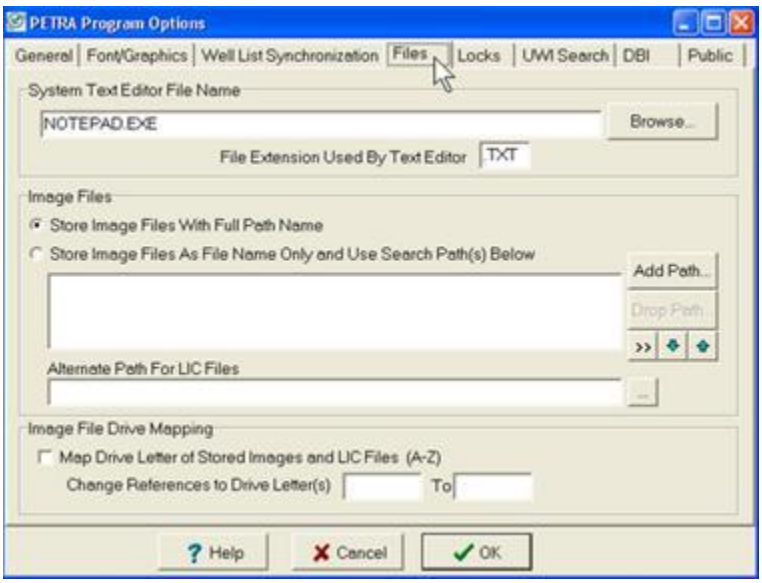
Project Settings→ Program Options - Well List Synchronization Tab



Use these options to automatically update the respective selected wells list when any of the synchronized module changes the selected wells. Main, Mapping, and Spread Sheet are three modules that are typically used for synchronization.

Files Tab

Project→ Settings→ Program Options - Files Tab



System Text Editor File Name section

The System Text Editor File Name defaults to Notepad.exe; however, you may change the default to use another text editor. The File Extension Used By Text Editor defaults to .TXT and can be changed to another extension.

This is the executable file name of a text editor used by PETRA to view or edit various text files and reports. Typical choices here are NOTEPAD, WORDPAD, and WRITE. The default is NOTEPAD.EXE.

The Image Files section

This option allows you to specify the path name(s) for searching for raster log images. By using a search path, PETRA stores only the file name in the database and resolves the full name using the search path. The advantage to using a search path is that projects may be moved to a different drive and still find the images. The disadvantage to using a search path is that the path has to be resolved each time an image is accessed.

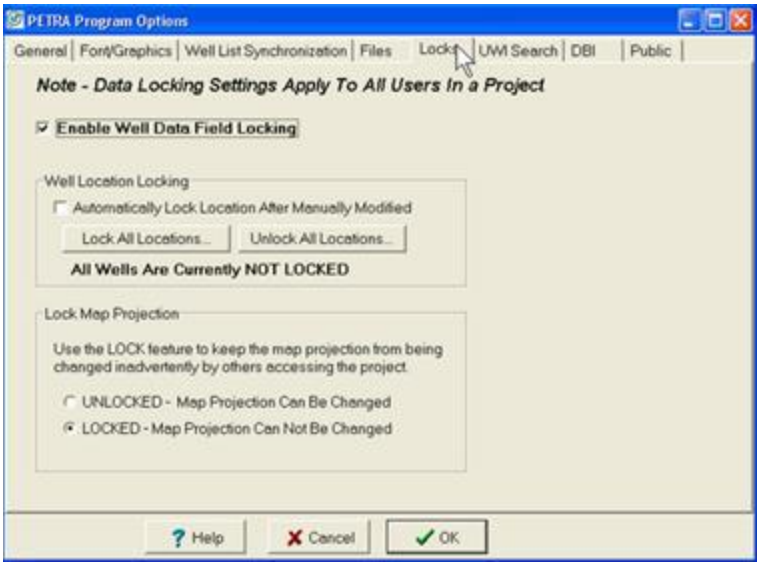
Note: Use the IMAGESEARCH.TXT file to specify the path(s) where the images may reside. Place the file at the root of the project images folder.

You have the following options when storing the IMAGESEARCH.TXT file:

- **Store Image Files With Full Path Name** - This is the default.
- **Store Image Files As File Name Only and Use Search Path(s) Below**. Use this option when the path(s) have changed for the images and you need to change the search path(s) for the images. Click the **Add Path...** button to browse to a folder where the images are located. You can add one or more paths.
- **Alternate Path For LIC Files** - You can add an alternate path for the log image calibration files by clicking on the button in that section and browsing to a folder where the .LIC files is stored.
- **Image File Drive Mapping** can be used to redirect where PETRA is looking for images and LIC files when the paths are exactly the same but the drive mapping has changed.

Locks Tab

Project→ Settings→ Program Options - Locks Tab


PETRA Program Options
General
Font/Graphics
Well List Synchronization
Files
Locks
UWI Search
DBI
Public
Note - Data Locking Settings Apply To All Users In a Project
Enable Well Data Field Locking
Well Location Locking
Automatically Lock Location After Manually Modified
Lock All Locations...
Unlock All Locations...
All Wells Are Currently NOT LOCKED
Lock Map Projection
Use the LOCK feature to keep the map projection from being changed inadvertently by others accessing the project.
UNLOCKED - Map Projection Can Be Changed
LOCKED - Map Projection Can Not Be Changed
Help
Cancel
OK

Well Location Locking

Well locations can be locked for all wells or for individual wells. Once a well's location is locked, it cannot be changed, either by import or manual edit, until the location is unlocked. You must first enable locking before well locations can be locked. Enable location locking by checking the Well Location Locking Enabled option. If you want a well's location to be locked automatically when manually edited, then check the Automatically Lock Location After Manually Modified option. A locked location will not be changed when data is imported from a file or any other method.

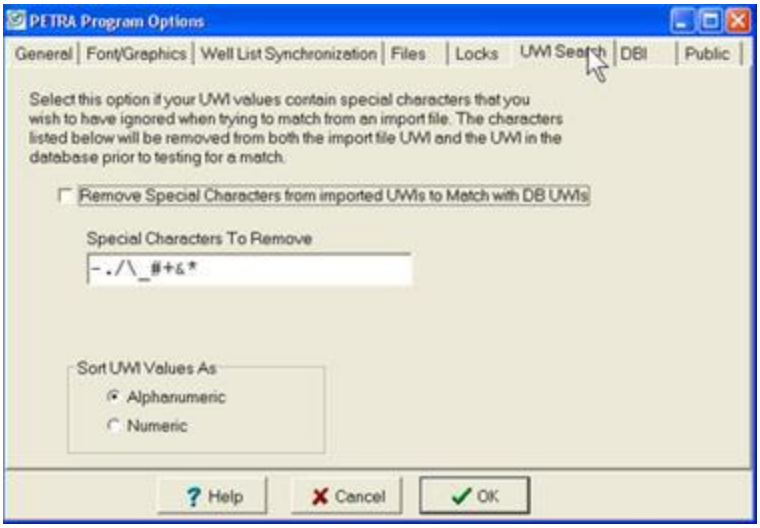
To force well locations to be locked, click the **Lock All Locations** button. To unlock all locations, click the **Unlock All Locations** button. The unlock function prompts you to unlock all wells or only those wells that were not individually locked.

Lock Map Projection

Use this lock feature to lock the map projection so it is not inadvertently changed by anyone accessing the map projection screen. Also, importing a Petra Project File (*.PPF) cannot change a locked map projection.

UWI Search Tab

Project→ Settings→ Program Options - UWI Search Tab


PETRA Program Options
General
Font/Graphics
Well List Synchronization
Files
Locks
UWI Search
DBI
Public
Select this option if your UWI values contain special characters that you wish to have ignored when trying to match from an import file. The characters listed below will be removed from both the import file UWI and the UWI in the database prior to testing for a match.
Remove Special Characters from imported UWIs to Match with DB UWIs
Special Characters To Remove
-./_#+&*
Sort UWI Values As
Alphanumeric
Numeric
Help
Cancel
OK

This screen allows you to set special characters that need to be removed from UWI values that are read from an import file when trying to match with the database UWIs with the same set of characters removed. The default set of characters are shown on the dialog screen above.

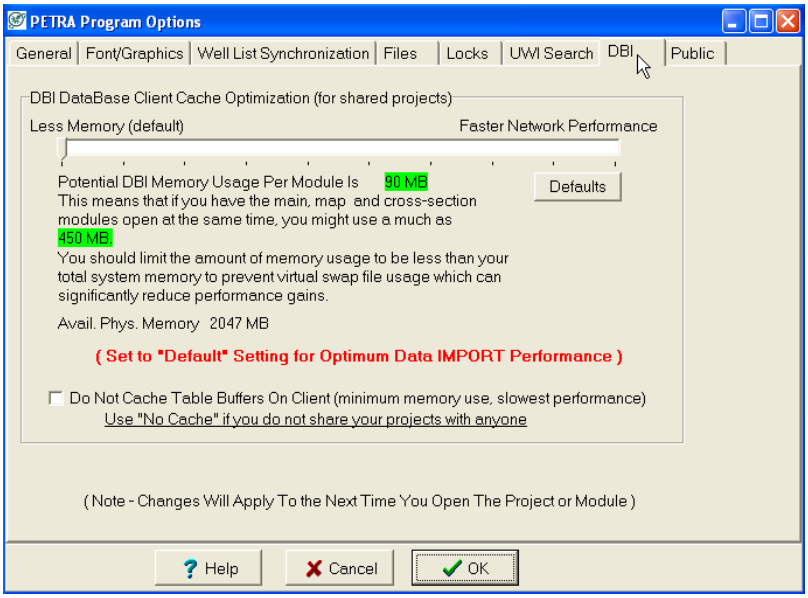
Click the check box to the left of the **Remove Special Characters from imported UWIs to Match with DB UWIs** to remove the special characters in both the import file UWI and the UWI as stored in the Well database. Add and/or delete the characters that are to be removed in the *Special Characters To Remove* data field.

Sort UWI Values As section

Note: The sort of the UWI Values defaults to Alphanumeric. To change the sort to Numeric, click the radio button to the left of **Numeric**. When you use the Numeric option, the UWI value cannot contain Alpha characters.

DBI Tab

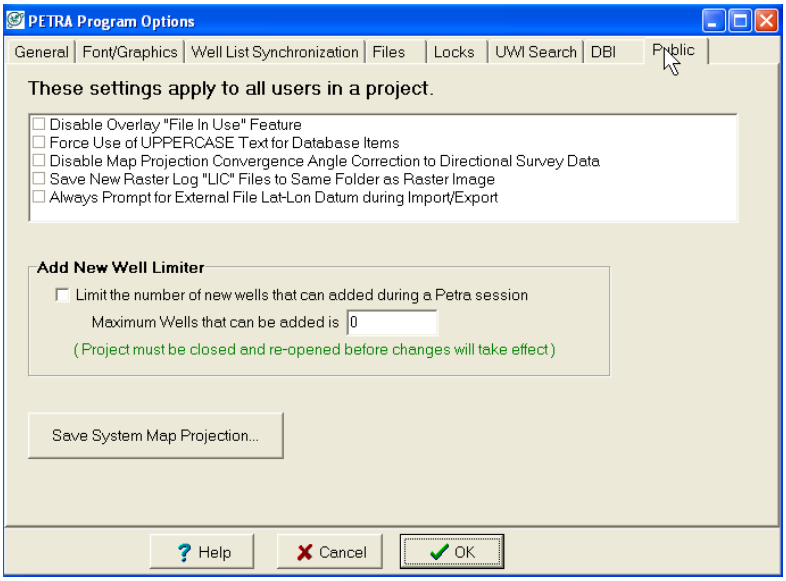
Project→ Settings→ Program Options - DBI Tab


PETRA Program Options
General
Font/Graphics
Well List Synchronization
Files
Locks
UWI Search
DBI
Public
DBI DataBase Client Cache Optimization (for shared projects)
Less Memory (default)
Faster Network Performance
Potential DBI Memory Usage Per Module Is 90 MB
This means that if you have the main, map and cross-section modules open at the same time, you might use a much as 450 MB
You should limit the amount of memory usage to be less than your total system memory to prevent virtual swap file usage which can significantly reduce performance gains.
Defaults
Avail. Phys. Memory 2047 MB
(Set to "Default" Setting for Optimum Data IMPORT Performance)
Do Not Cache Table Buffers On Client (minimum memory use, slowest performance)
Use "No Cache" if you do not share your projects with anyone
(Note - Changes Will Apply To the Next Time You Open The Project or Module)
Help
Cancel
OK

The options here have been set to make optimum use of the system memory and cache. Our recommendation: **Leave the settings set to their default values**.

Public Tab

Project→ Settings→ Program Options - Public Tab


PETRA Program Options
General
Font/Graphics
Well List Synchronization
Files
Locks
UWI Search
DBI
Public
These settings apply to all users in a project.
Disable Overlay "File In Use" Feature
Force Use of UPPERCASE Text for Database Items
Disable Map Projection Convergence Angle Correction to Directional Survey Data
Save New Raster Log "LIC" Files to Same Folder as Raster Image
Always Prompt for External File Lat-Lon Datum during Import/Export
Add New Well Limiter
Limit the number of new wells that can added during a Petra session
Maximum Wells that can be added is 0
(Project must be closed and re-opened before changes will take effect)
Save System Map Projection...
Help
Cancel
OK

The **Disable Overlay "File In Use" Feature**, when selected, displays a warning message whenever you load an overlay file that has already been loaded by another user. If you are the first user to open a particular overlay file, you become its owner with rights to save over the

existing file. All other users cannot overwrite the file until the owner exits Petra or closes the overlay file.

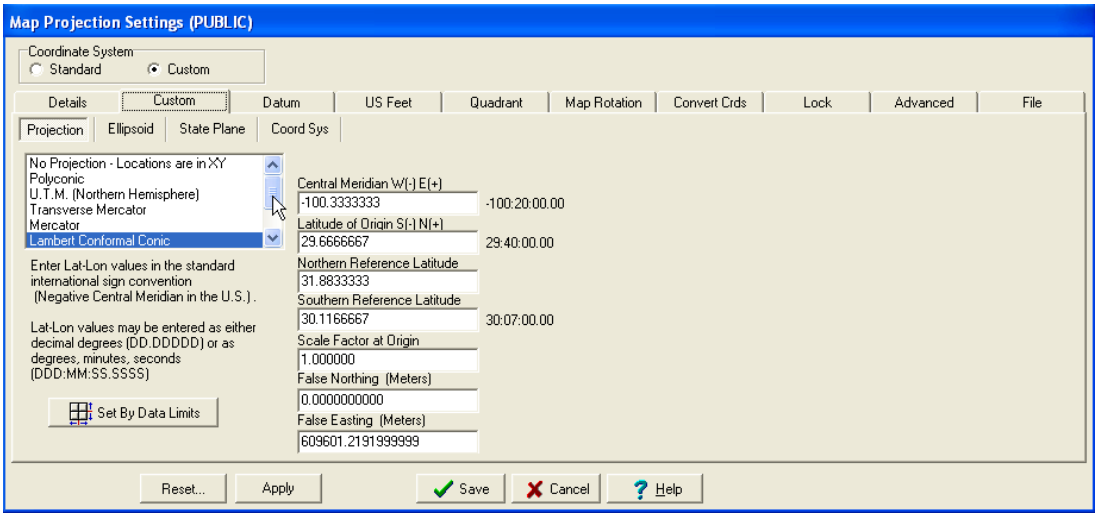
Set Map Projection...

Note: PETRA uses the Blue Marble Database (geocalc.xml) that contains all of the international dautms and coordinate systems. Two Coordinate Systems are provided in PETRA for setting up the map projection. Determine what datum the latitude and longitude values have by asking the vendor what the datum is for the locations. If the locations are XY coordinates, you must also find out what projection was used to create the XY coordinates.

The **Standard** method utilizes standard coordinate systems provided by the Blue Marble geodetic transformation library. This option provides most projections commonly used in energy mapping projects. Examples are U.T.M. and State Planes.

The **Custom** method allows you to select and customize a specific projection algorithm by changing default settings, such as, central meridian, ellipsoid, or false eastings and northings. The Custom method also includes common, but not all State Plane settings.

Click the Main module's **Project→ Settings→ Set Map Projection...** menu to bring up the ***Map Projection Settings*** dialog screen.



The map projection settings determine how Latitude-Longitude coordinates are converted to X,Y coordinates for display purposes. If your project contains only X,Y locations, choose the **No Projection - Locations are in XY** option. If you are not sure which projection to use or don't really care, choose the Polyconic Projection. Polyconic works well except very near the equator, in which case choose UTM.

Make sure the datum that you chose agrees with the datum for the coordinates that you will use to load into PETRA.

Click the **Help** button for assistance with the various settings.

System Colors...

You can customize all graphics elements, such as borders, titles, screen background, etcetera. Screen color and plotter color for each element can be selected independently from a palette of 16 solid colors. Line thickness and style (solid, dashed, dotted, etcetera) can also be selected for each element. Customization of the system colors can be accessed via the Main module's Project→ Settings→ System Colors menu. Also, colors for individual modules can be changed from the Display→ Colors menu of the module.

Well Symbols...

This option displays the symbols that have descriptions assigned to use in your projects. They are displayed on the left side of the dialog screen in the section titled Current Well Descriptions. The total number of symbols available to you in PETRA are displayed in the right display panel, titled Symbol Definition under the section titled, Available Symbols. Currently, there are 238 symbols available to choose from.

To change the color or description for a Well Symbol, click the symbol in the Current Well Descriptions portion of the dialog screen. The Symbol Code, current description, Screen Color, and Plotter Color are displayed in the Symbol Definition portion of the dialog screen. Change the current information for the selected symbol, and then click **Apply**.

To add a Well Symbol to the Current Well Descriptions,

1. Click the New Description button.
2. Type in the Symbol Code that you want to use in the Symbol Code data field. You can use up to a maximum of eight characters for the Symbol Code.
3. Type in a description in the *Description* data field. You can use up to 60 characters for the description.
4. Click the color for the Screen and Plotter Color Selection.
5. Scroll down the list of Available Symbols, and then click the one that you want to add.
6. Click the **Apply** button. The new symbol is added to the bottom of the Current Well Descriptions list.
7. Click the **OK** button with the green check mark

.

Note: You may have to make an entry in the symtrans.usr file for the project depending on the new Symbol Code. This file is located in the project\parms folder and contains the import data Symbol Codes that are to be imported in the left column and the PETRA Symbol Codes in the right column that the input Symbol Code will be translated into.

The file can be edited using Notepad.exe. Add the new Symbol Code in the file and the translation code for that symbol. This is necessary for PETRA to be able to translate Symbol Codes during the import of wells and their Symbol Codes.

As an example, a new Symbol with a Symbol Code of OILPROD was added to the Symbol Descriptions and a data file was loaded with that code. If the sumtrans.usr file is not edited to contain the new Symbol Code and Translation, the Symbol that will be displayed is OIL due to the following record in the translation file: OIL* OIL.

By adding a record above the OIL* OIL record that reads =OILPROD OILPROD, that translation will be handled properly and the Symbol selected for OILPROD will be displayed instead of the OIL symbol.

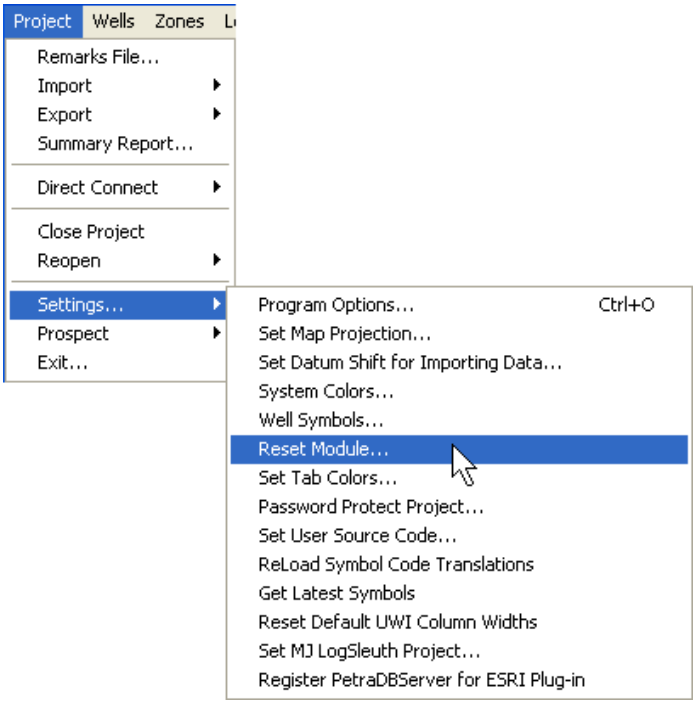
To drop a Well Symbol from the Current Well Descriptions list,

1. Click the Symbol in the Current Well Descriptions list that is to be dropped.
2. Click the **Drop Description** button. That Well Symbol is deleted from the current list.
3. Click the **OK** button with the green check mark.

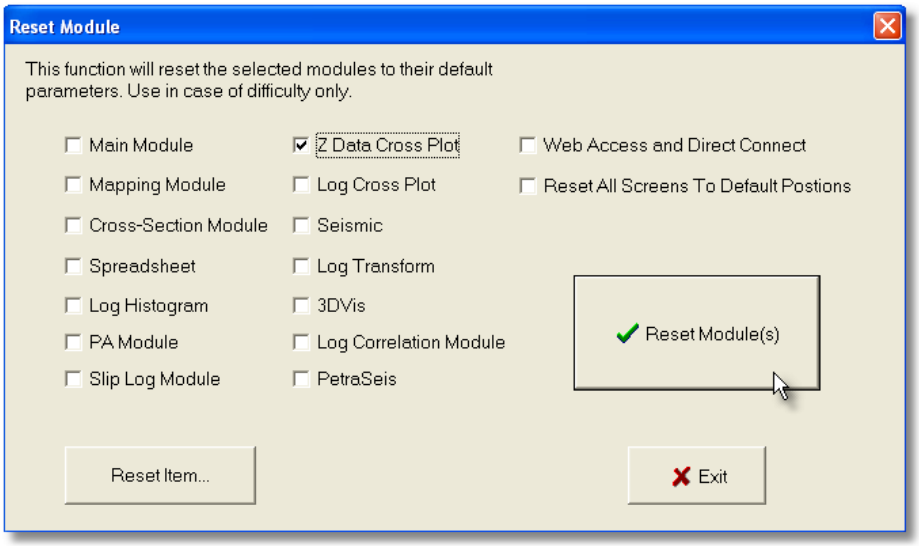
Reset Module...

This option is used to reset a module that has become inoperable.

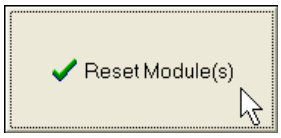
You may want to save some parameter files before you reset the module. For instance, when you Post Well Data, you can save a template that can be reloaded after resetting the module so you don't have to re-build your data posting template. The saving of the parameter file may not be called a template for each option. As an example, the Attribute Map uses the term Settings instead of Template. For each option where you have data displayed on the map, save your settings or template if you want to recover those parameters after resetting the module.



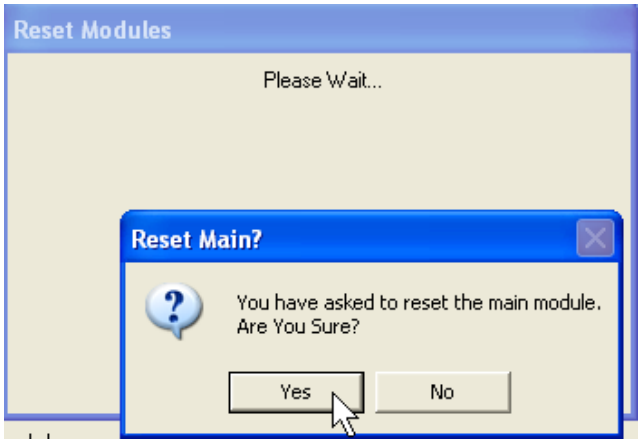
1. Click the check box next to the module that you want to reset.



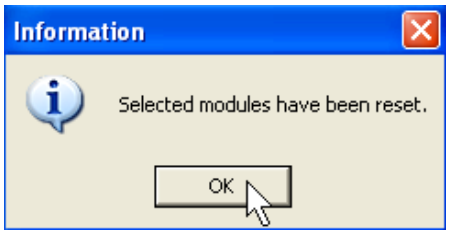
2. Click **Reset Module(s)** button.



The message displayed below is shown.



3. Click **OK**.



The selected module is set to the defaults for that module. You may have to re-enter some settings.

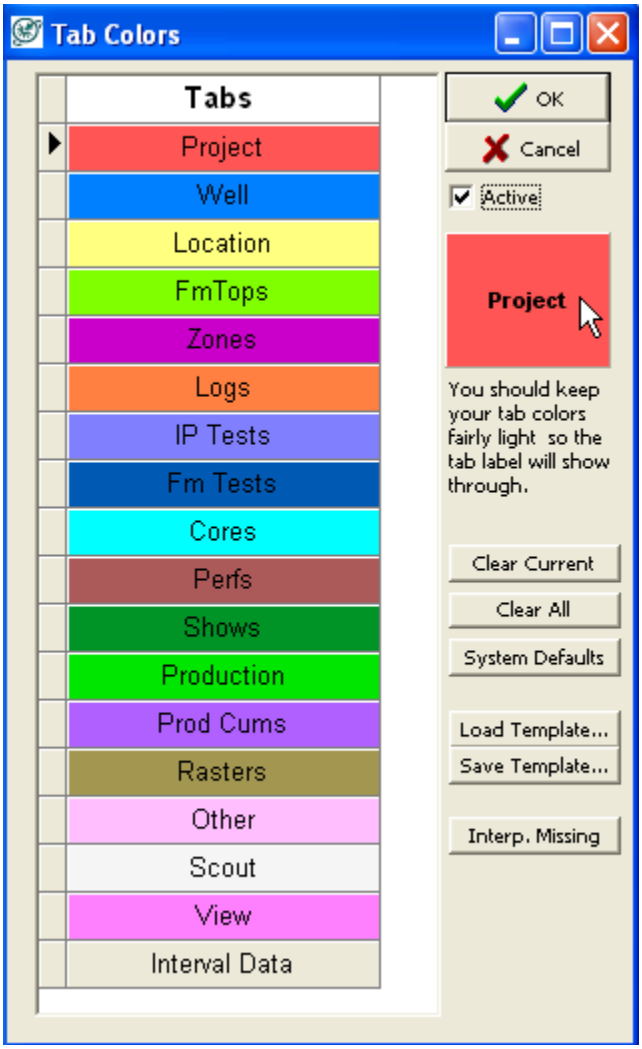
You can re-load the individual setting or template files for each option that you saved the files for. Do not load a saved Map Settings File if you were having problems with the map settings that were used before you reset the Map Module. You can reload a different saved Map Setting File that you know worked properly before the error and go from there.

Set Tab Colors...

This option is used to set the colors for each of the tabs in the Main module. There are system default colors that can be changed. If you create your own colors, keep the tab colors fairly light so the tab label shows through. You can also display this menu by right clicking on the **Tab** or the **Active Tab Indicator** displayed to the right of the module icons. A ***Set Tab Colors…*** dialog

box is displayed. Click the **Set Tab Colors…** menu

to bring up the ***Tab Colors*** dialog screen.

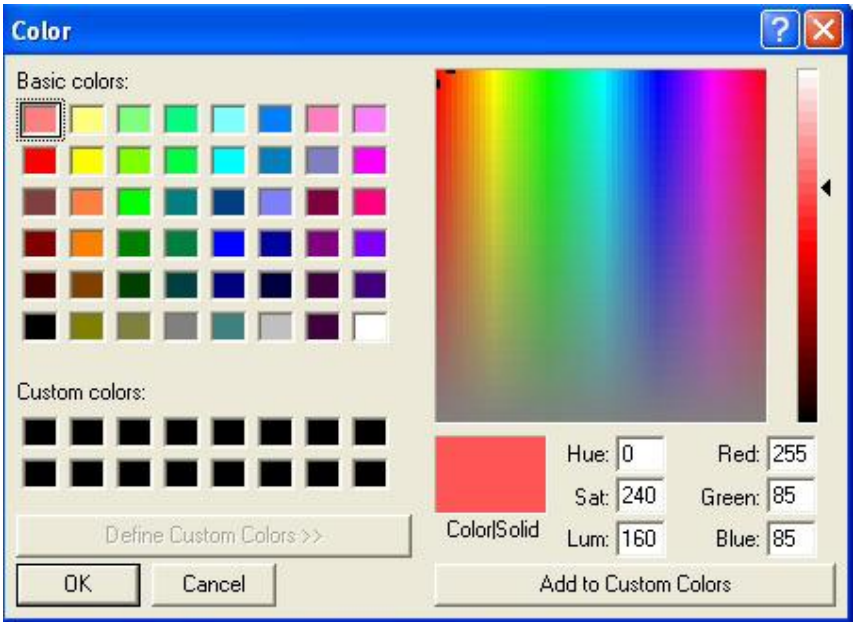


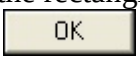
Either double click the tab

or the color icon

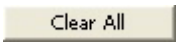
to be changed. You see the selection indicator displayed to the left of the tab that you want to change the color for.

The ***Color*** selection dialog screen is displayed.

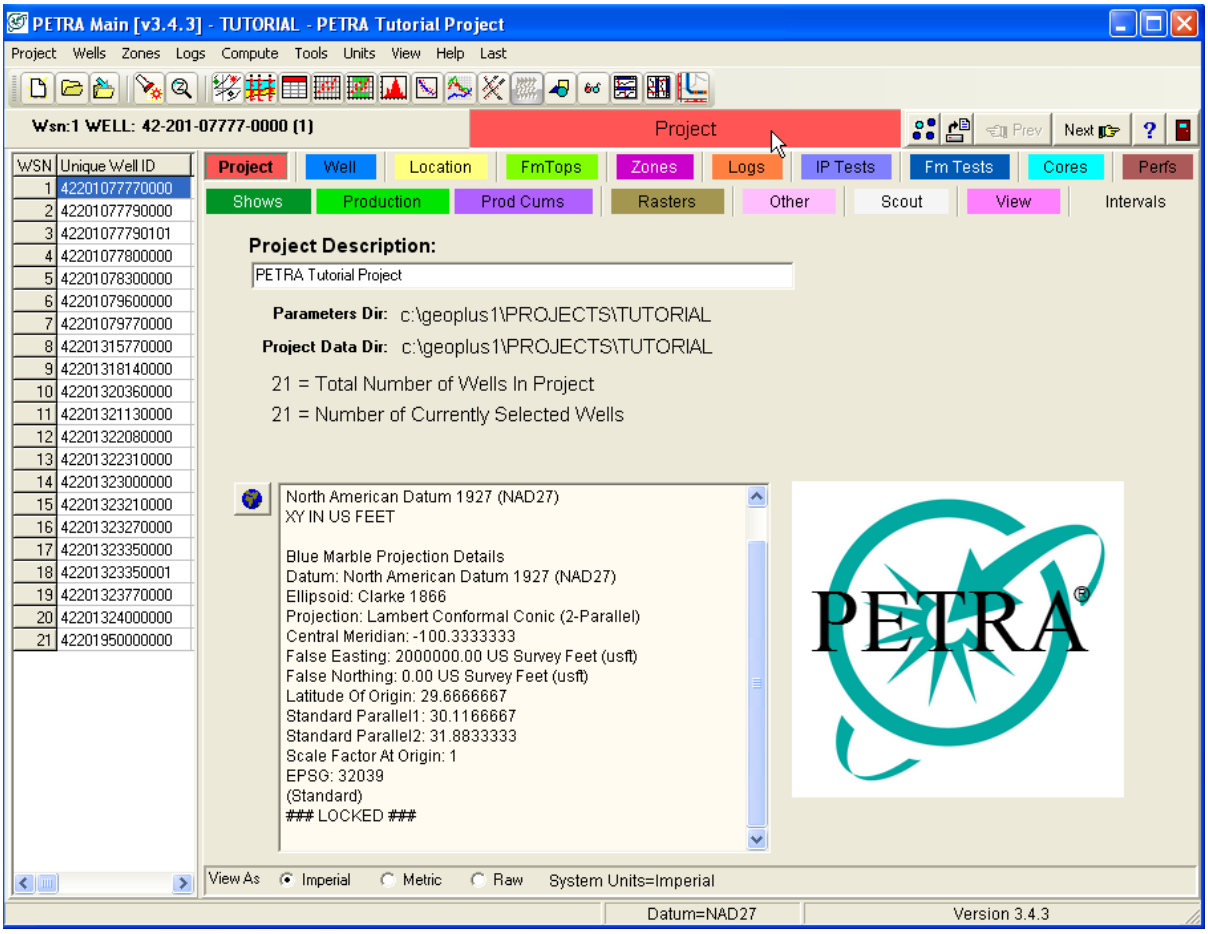


The default color is shown as the selected color by the rectangle square around the color box. Select the new color, and then click the **OK** button  to accept the new selected color.

The default color scheme is displayed on the tabs in Main module below. The rest of the screen shots for Main do not show the tabs with colors.

If you do not want to use any colors, click the **Clear All** button  and uncheck the **Active** check box in the ***Tab Colors*** dialog screen, shown above.

An example of colored tabs is shown below.



You can download the manual from https://petraftp.ihsenergy.com/Petraman.zip The password to unzip the file is ***petraplus***. The file is a PDF document.

Password Protect Project...

This option is used to protect a project by requiring the user to know a password. Enter the password in the *New Password* (5-20 Chars) and the *Confirm Password* data fields. Click the **OK** button with the green check.

If the Confirmation password is incorrectly entered, or is left blank, you see the following message:

Once both passwords are entered correctly, you see:

Click the **OK** button with green check.

To change the password, click the Radio button to the left of the **Remove Project Password** option and enter the current password for the project in the *Current Password* data field, and then click the **OK** button with the green check.

You see the following message.

Click the **OK** button.

Repeat the process described above to enter a password for the project. The new password is now required when opening the project.

When you try to open a project that is password protected, you see the following message:

Enter the assigned password for the project, and then click the **OK** button with the green check

.

If the password has been forgotten, contact IHS Customer Care – PETRA instructions on how to reset the password.

ReLoad symbol code translations

This option reloads the translation codes for well symbols using the SYMTRANS.DEF file located in the PARMS folder where PETRA was installed. This is the System Path that was set up when PETRA was installed or, if using a network version, when the Client was installed on the local machine.

You see the ***Information*** dialog screen. Click **OK**.

You see a confirmation dialog screen. If you want to translate the well symbols codes for the currently selected wells using the new translation file, click the **Yes** button; otherwise, click the **No** button.

Get latest symbols

This option is used to obtain the latest set of symbols available from the System Path that was set up when PETRA was installed or, if using a network version, when the Client was installed on the local machine.

Click **OK** to obtain the latest set of symbols from the System folder or click the **Cancel** button to keep the set of symbols that are currently being used.

Click **OK** to complete the process.

Reset default UWI column widths

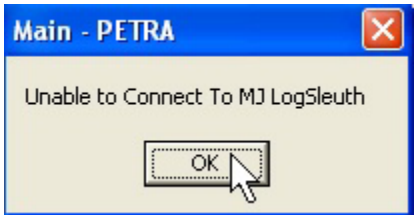
This option resets the columns to the right of the WSN column on the Main screen.

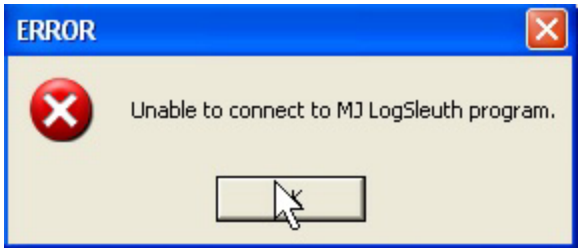
Set MJ LogSleuth Project…

You must have JM LogSleuth installed on your machine, and you must have a subscription for MJ LogSleuth.

- Set the project path that you are using for your MJ LogSleuth images.

The following messages are displayed if you do not have MJ LogSleuth installed.





Register PetraDBServer for ESRI Plug-in

The ArcMap extension is a menu tool added to ESRI's ArcMap product that allows data exchange with a PETRA product.

Requirements:

- PETRA ESRI licenses(s) using FlexLM for Windows license management
- ESRI ArcMap 9.1 or newer

Select this option to automatically register the components in the PC Registry. Administrative rights are necessary to register the components.

Installation of the PETRA Toolbar in ArcMap:

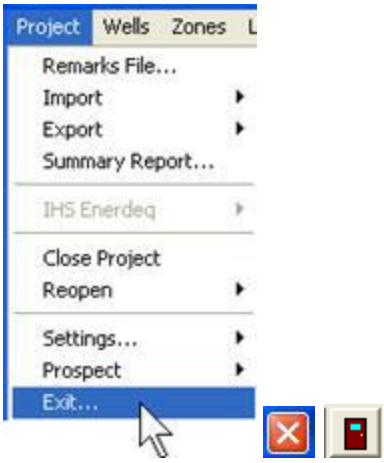
To add this toolbar to ArcMap,

1. Start **ArcMap** and from the Tools menu, select **Customize**.
2. Click the **Add from file** button, and then browse to select the **PetraESRI.dll file**.
3. From the Tools menu, select **Customize,** and then check the box next to the word **PETRA**.

   The toolbar is added to ArcMap, and you can access PETRA data using these components. If PETRA can open the project and access the data in Main, then the ArcMap toolbar can open the project and access the data.

Project>Exit Menu

The Project→ Exit menu option can be used to close the current project and exit PETRA.

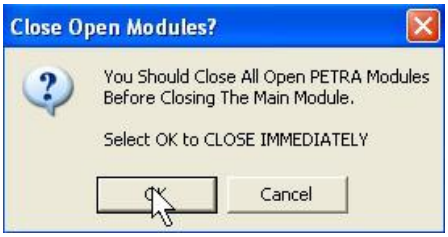


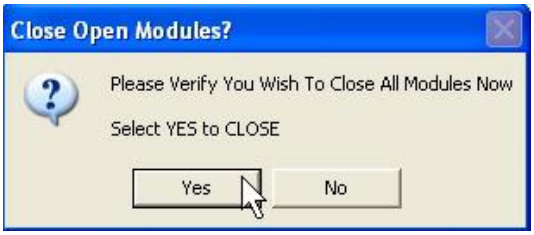
Other options for closing a project and PETRA are provided by clicking the PETRA logo in the upper left corner and selecting **Close** on the dialog screen, or by clicking the red **X** in the upper right corner, or the **Close** and **Exit** icon that looks like a door.

When the Exit PETRA message is displayed, click **OK**.

If this ***Close Open Modules*** dialog screen is displayed instead, you have the option of clicking the **Cancel** button, which allows you to close each of the open modules, or you can click the **OK** button to have PETRA close each of the open modules. This latter option is useful if you have used Task Manager to close one of the modules.

The following dialog screens are displayed when you click the **OK** button.


Close Open Modules?
You Should Close All Open PETRA Modules Before Closing The Main Module.
Select OK to CLOSE IMMEDIATELY
OK
Cancel



Set MJ LogSleuth Project...

The ***MJ LogSleuth Projects*** dialog screen is displayed if you have installed LogSleuth. Instead of just showing one project, you may see several projects. It depends on how many projects you have in LogSleuth.

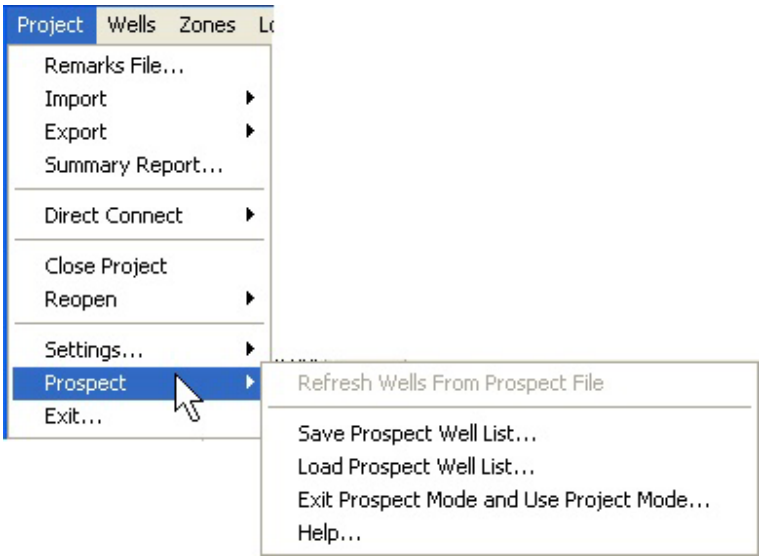
1. Highlight the LogSleuth project that you want to use in PETRA.

2. Click the **OK** button with the green check.

   If you have not installed LogSleuth, you see the following messages displayed.

Project>Prospect menu

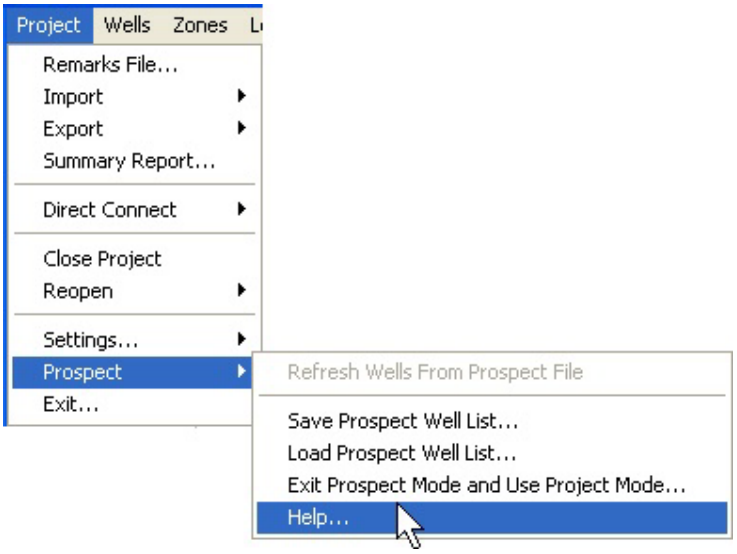
The Project→ Prospect menu option is used to create a prospect well list, load a prospect well list, or to change the wells from Prospect mode to Project mode. When in Project mode, all of the wells for the entire project are used. There is a Help section for Prospects.



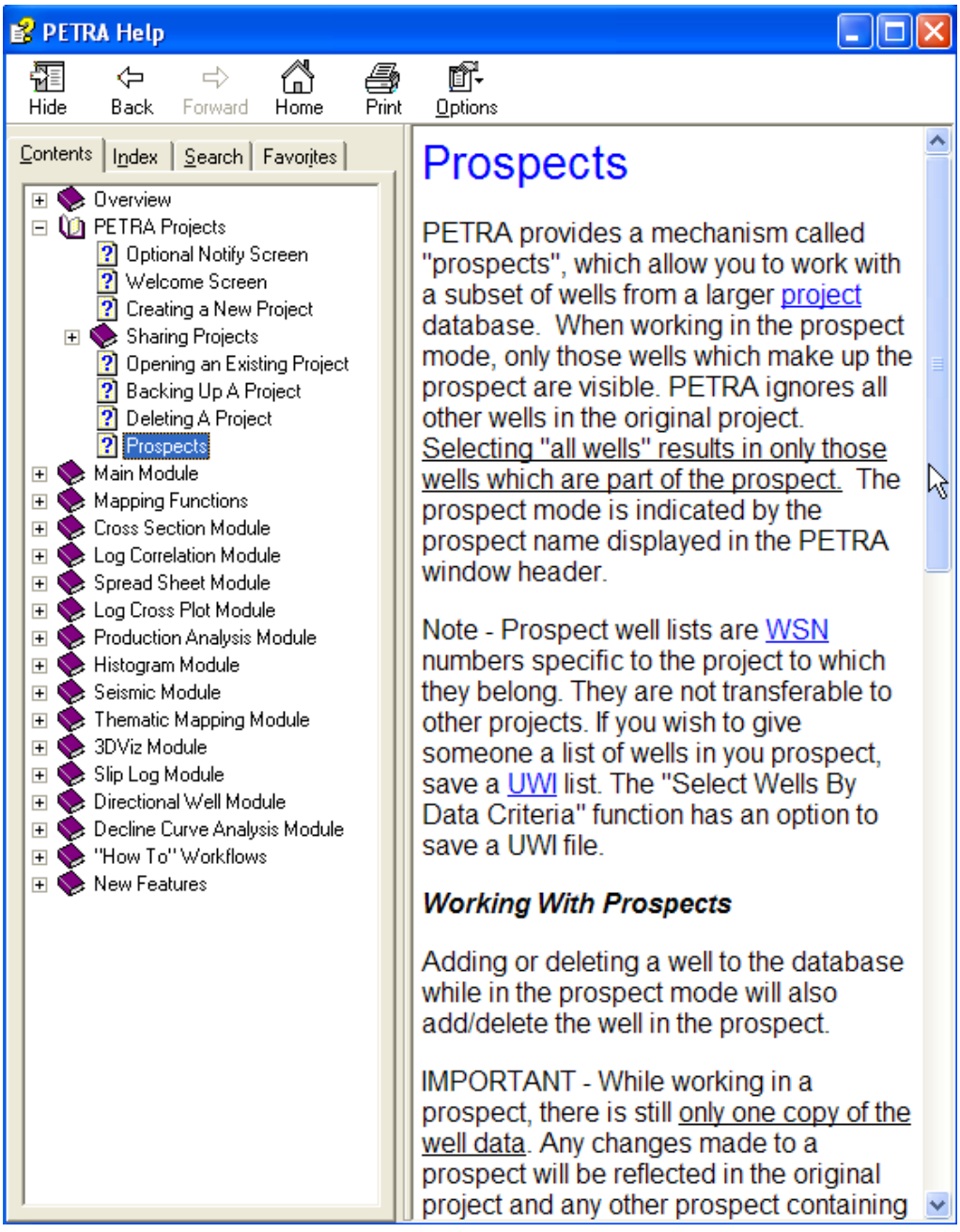
Help

The Help menu displays the information available for Prospects.

Click **Project→ Prospect→ Help...** menu to display the ***Prospects Help*** dialog screen.

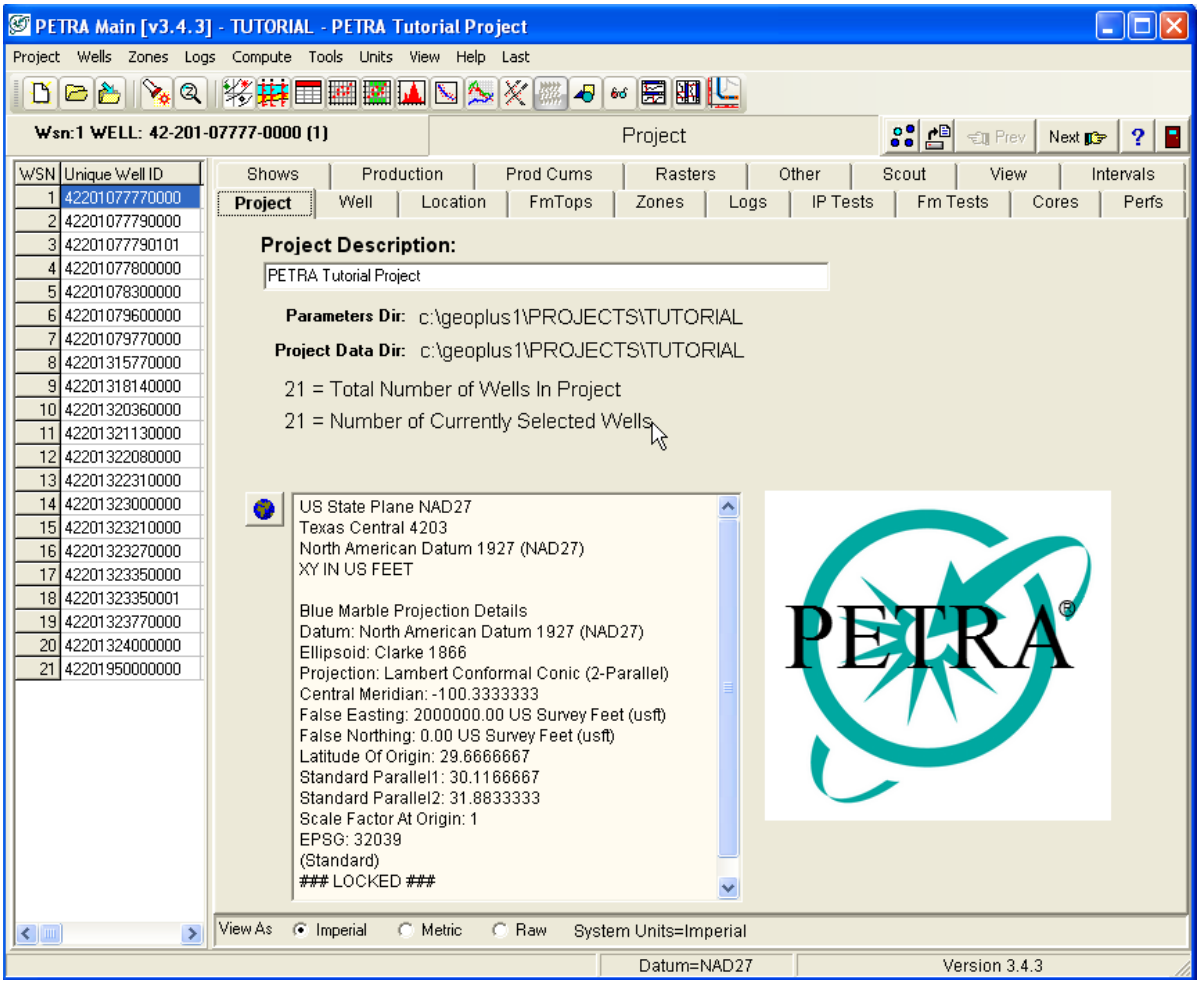


The ***PETRA Help*** dialog screen is displayed. Click and drag the Scroll button to view the remaining information in the Prospects help screen.


PETRA Help
Hide
Back
Forward
Home
Print
Options
Contents
Index
Search
Favorites
Overview
PETRA Projects
Optional Notify Screen
Welcome Screen
Creating a New Project
Sharing Projects
Opening an Existing Project
Backing Up A Project
Deleting A Project
Prospects
Main Module
Mapping Functions
Cross Section Module
Log Correlation Module
Spread Sheet Module
Log Cross Plot Module
Production Analysis Module
Histogram Module
Seismic Module
Thematic Mapping Module
3DViz Module
Slip Log Module
Directional Well Module
Decline Curve Analysis Module
"How To" Workflows
New Features
Prospects
PETRA provides a mechanism called "prospects", which allow you to work with a subset of wells from a larger project database. When working in the prospect mode, only those wells which make up the prospect are visible. PETRA ignores all other wells in the original project. Selecting "all wells" results in only those wells which are part of the prospect. The prospect mode is indicated by the prospect name displayed in the PETRA window header.
Note - Prospect well lists are WSN numbers specific to the project to which they belong. They are not transferable to other projects. If you wish to give someone a list of wells in you prospect, save a UWI list. The "Select Wells By Data Criteria" function has an option to save a UWI file.
Working With Prospects
Adding or deleting a well to the database while in the prospect mode will also add/delete the well in the prospect.
IMPORTANT - While working in a prospect, there is still only one copy of the well data. Any changes made to a prospect will be reflected in the original project and any other prospect containing

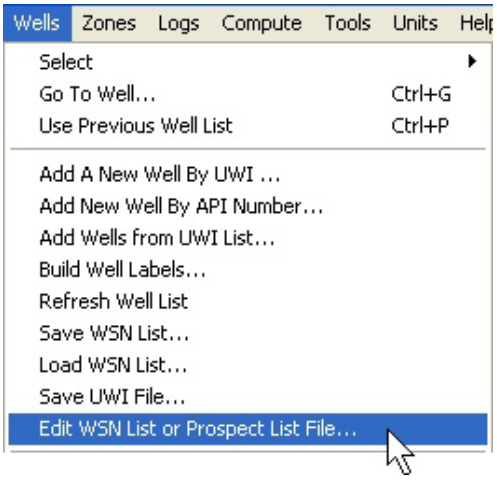
Save Prospect Well List Menu

Using the Sample or Tutorial project, the Main screen shows the Total Number of Wells in Project and the Number of Currently Selected Wells.



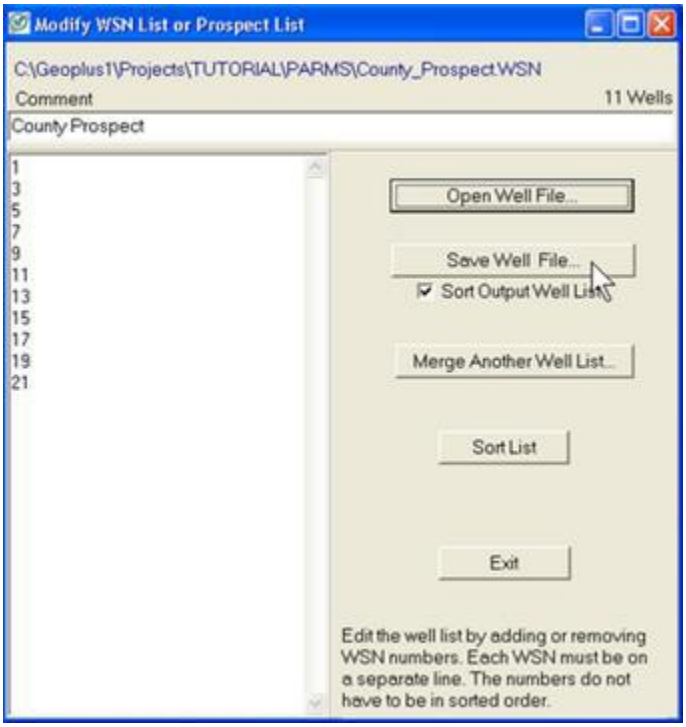
Arbitrarily select the odd numbered WSNs.

1. Click **Wells→ Edit WSN List** or **Prospect List File...** menu.

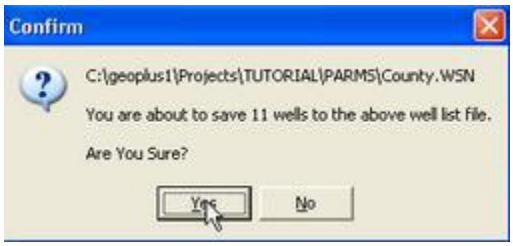


2. Enter the Comment, County Prospect, or your own prospect name in the *comment* data field.

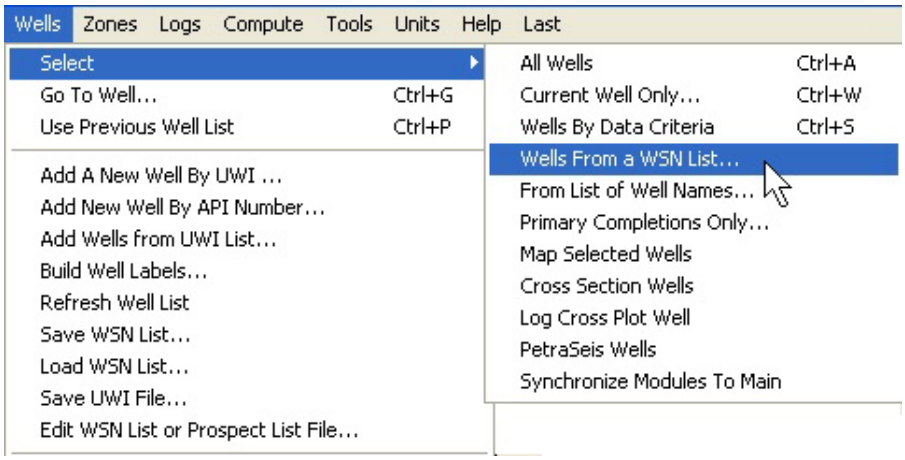
3. Enter the odd numbered Well Sequence Numbers as shown below.



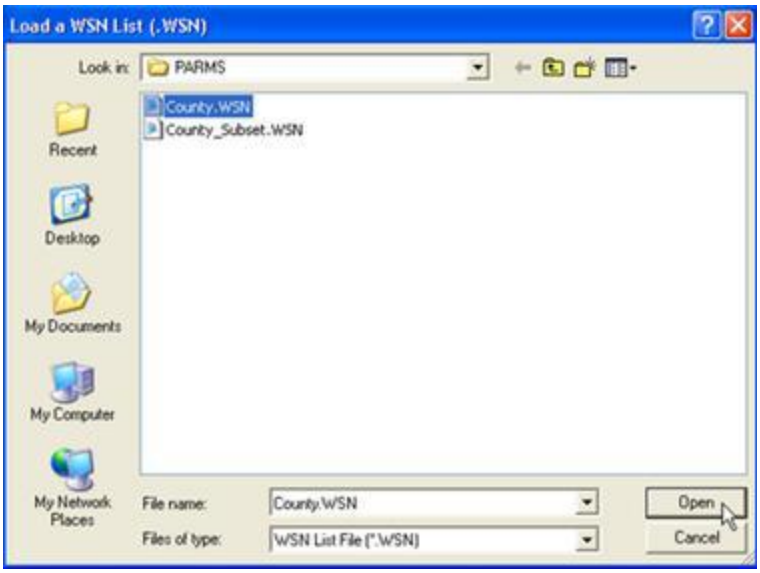
4. Click **Save Well File**. Enter a file name for the WSN List to be saved to. We used **County.WSN**.

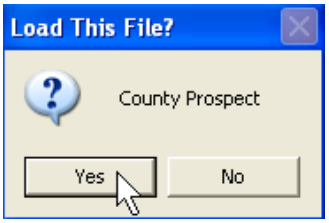


5. Click **Yes**.
6. Click the **Exit** button to close the dialog screen.
7. Click **Wells → Select → Wells from a WSN List...** menu or the **Wells Load → WSN List...** menu.



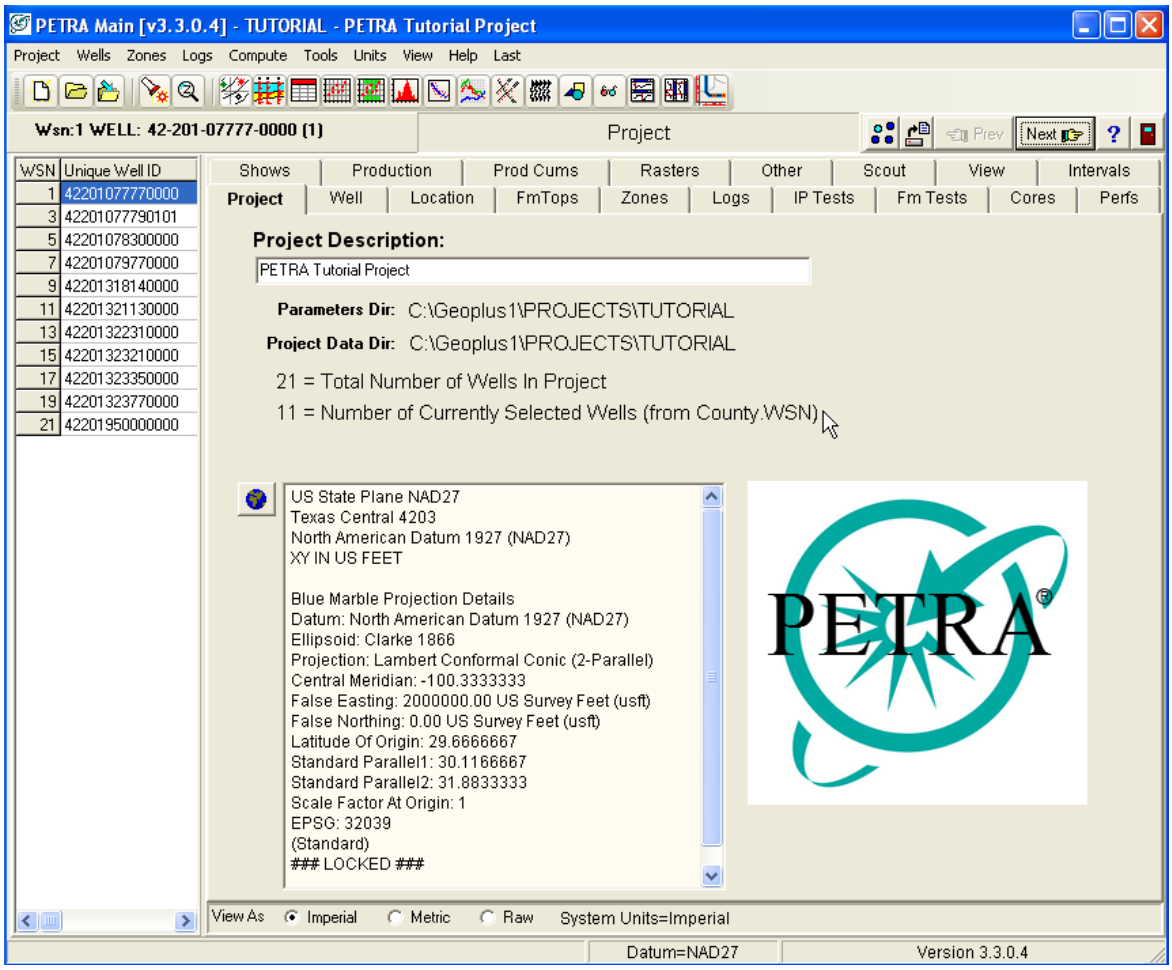
8. Select your file that you saved. Click the **Open** button.



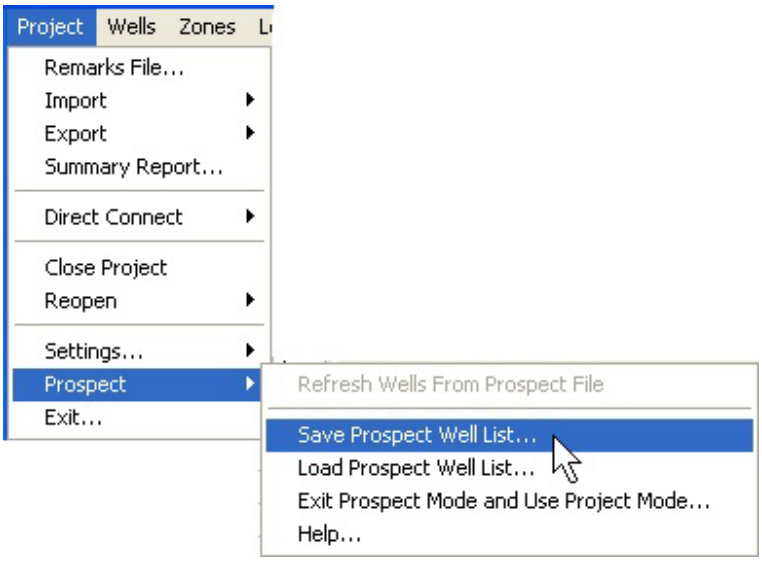


9. Click **Yes** on the ***Confirm*** dialog screen.

   Parameters are set in a similar way to this one, depending on your well selection list.

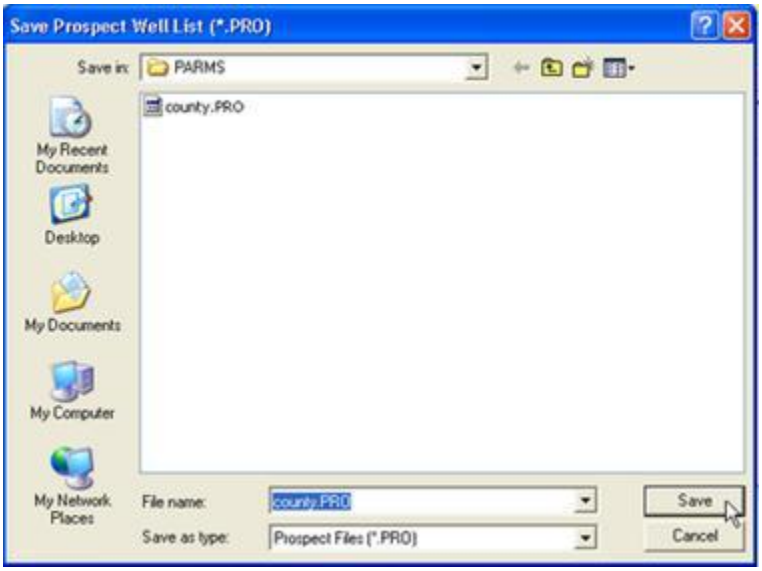


10. Click the **Project → Prospect → Save Prospect Well List...** menu.

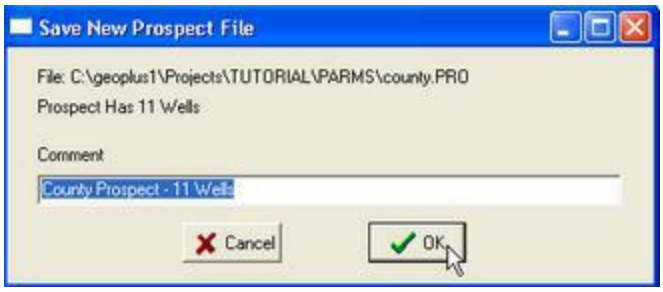


The ***Save Prospect Well List (*.PRO)*** dialog screen is displayed.

11. Enter the file name for the Prospect, and then click **Save.**



12. Enter the Text to comment the prospect file, and then click **OK**.

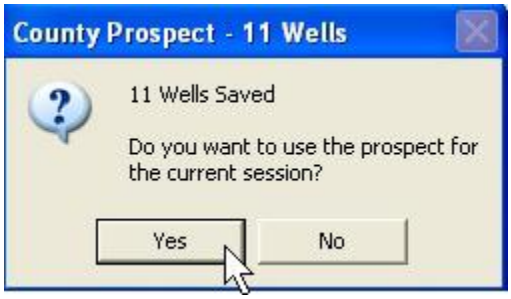


The ***Save Prospect Well List (*.PRO)*** dialog screen is displayed.

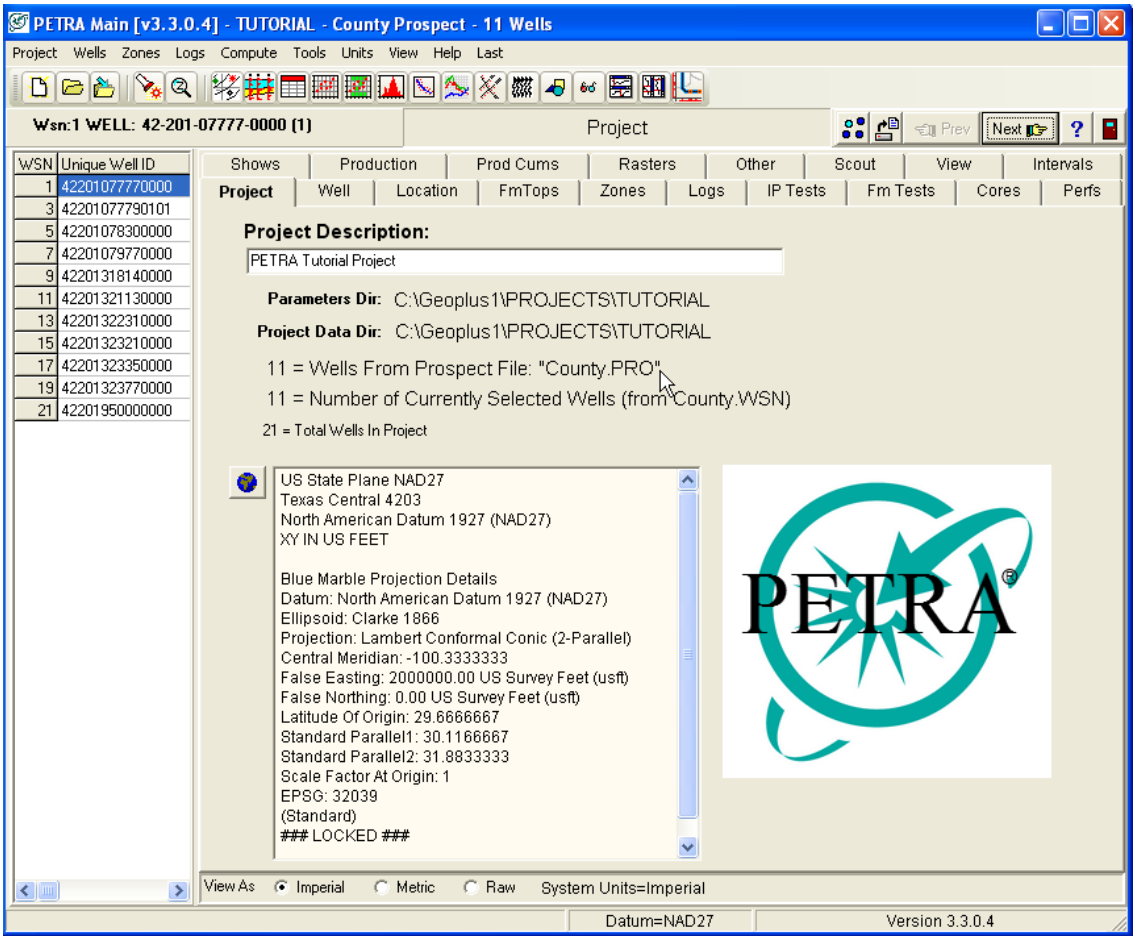
13. Enter the file name for the Prospect, and then click **Save**.

    A dialog screen with the number of wells selected for the prospect is shown.

14. If you want to put the project into Prospect mode for the selected wells, click **YES;** otherwise, click **No**.



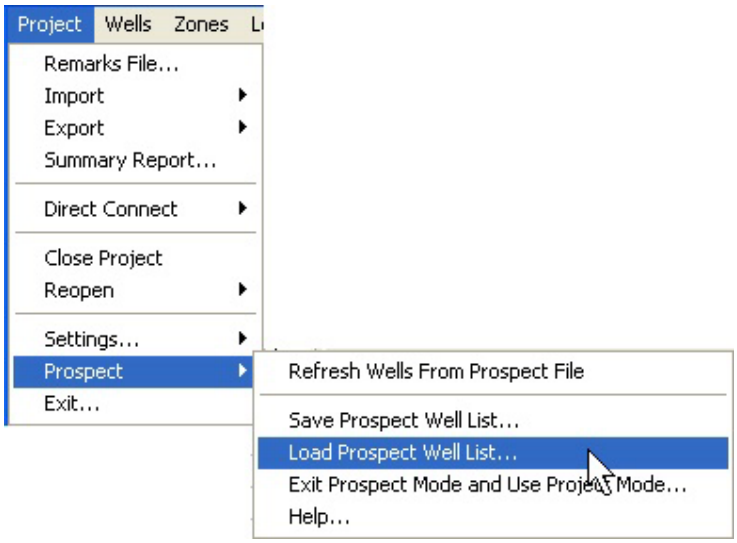
Using the Sample or Tutorial project, the Main screen looks like this after setting to prospect mode. Note the information about the total number of wells and the number of wells currently selected. There is information about the number of wells for the Project that has been selected.



Load Prospect Well List menu

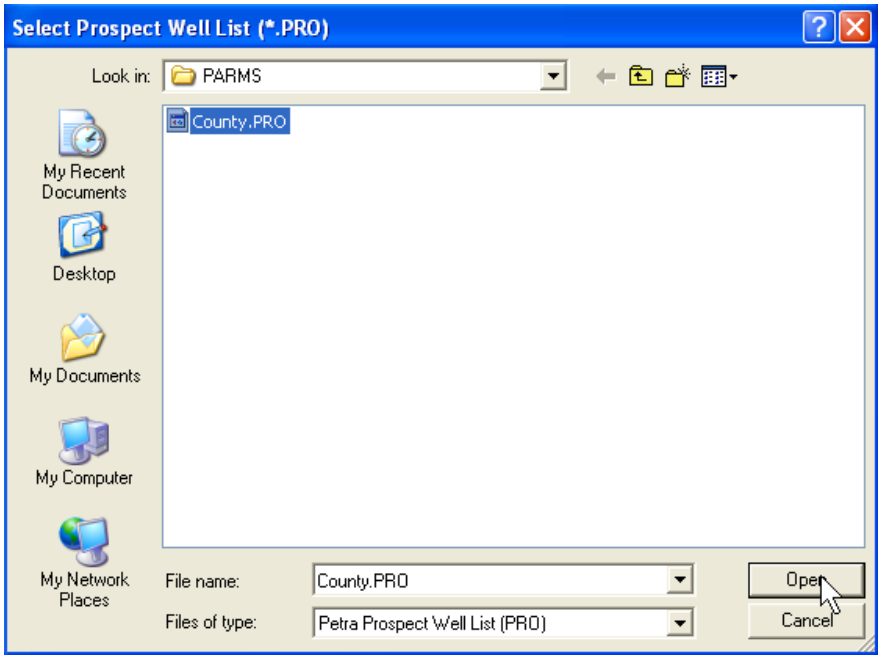
To load a saved prospect well list

1. Click the **Project → Prospect → Load Prospect Well List...** menu.

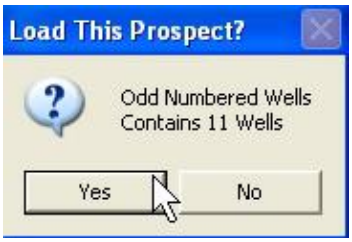


The **Select Prospect Well List (*.PRO)** dialog screen is displayed.

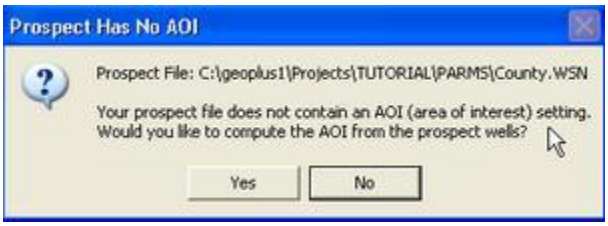
2. Select the Prospect that you want to load, and then click the **Open** button.



3. Click **Yes** on the ***Load This Prospect?*** dialog screen to load the wells for the selected prospect.

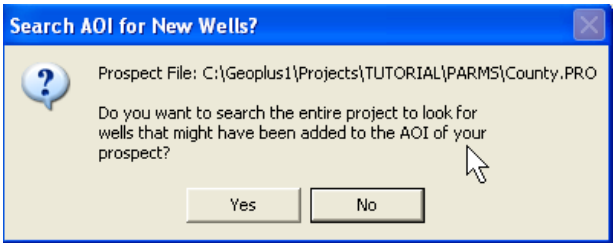


4. If the prospect well list does not contain an AOI Area Of Interest set of limits due to being created in an older version of PETRA, the following dialog screen is displayed:


Prospect Has No AOI
Prospect File: C:\geoplus1\Projects\TUTORIAL\PARMS\County.WSN
Your prospect file does not contain an AOI (area of interest) setting.
Would you like to compute the AOI from the prospect wells?
Yes
No

5. Click the **Yes** button to set the Area Of Interest for the prospect wells.

   If the prospect well list does contain an AOI Area Of Interest set of limits, the following dialog screen is displayed:


Search AOI for New Wells?
Prospect File: C:\Geoplus1\Projects\TUTORIAL\PARMS\County.PRO
Do you want to search the entire project to look for wells that might have been added to the AOI of your prospect?
Yes
No

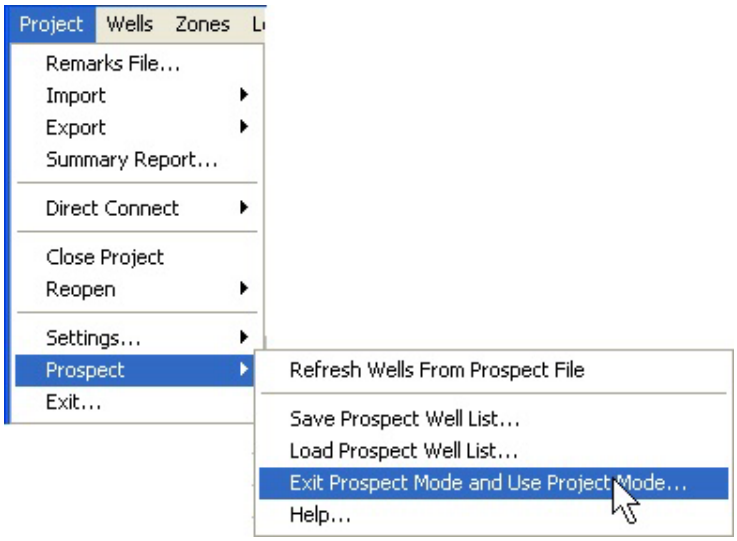
6. If you have added wells to the project and if some of those wells reside in the AOI of the prospect, click the **Yes** button to search the entire project to look for the new wells that may reside in the AOI. After the search is completed, if there are new wells for the prospect, update the prospect well list.

   You see the selected wells in Main for the selected Prospect.

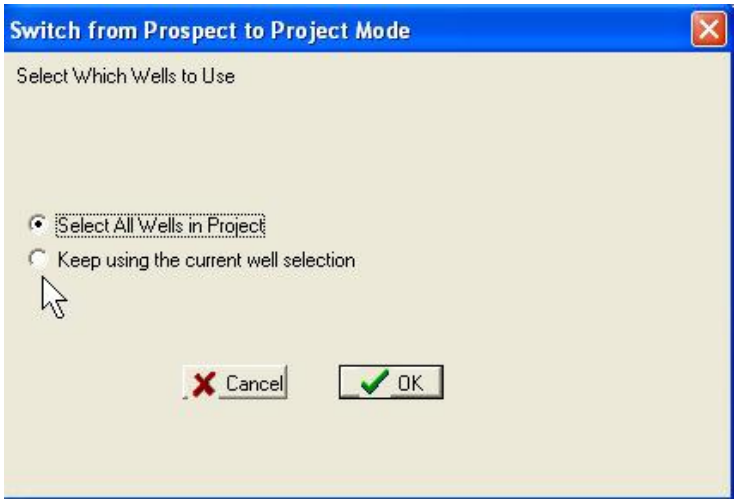
Use Entire Project

To load all of the wells for the project

1. Click the **Project → Prospect → Use Entire Project...** menu.



The following dialog screen is displayed.


Switch from Prospect to Project Mode
Select Which Wells to Use
Select All Wells in Project
Keep using the current well selection
Cancel
OK

2. Click the radio button to the left of the option you want to use for selecting the wells that you want displayed in Main.
3. Click the **OK** button to select and use the wells that you have chosen.

4

Main Module

Review the Main module to understand the management of project data and how to access the other modules.

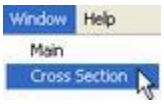
Switching Between Modules

Each PETRA module is an executable program in communication with Main and other active modules. Each module appears in the Windows task bar and can be accessed by clicking the module task bar icon.

An example of the Start Bar for XP is shown below. Shown are the Start, Quick Launch Tool Bar, Task Bar items; Main Module, Cross Section Module and the Map Module.

Each module also contains a Window menu from which any active module can be accessed. The screen capture below shows the menu from the Cross Section module. When you click **Window → Main**, you return to the Main module.

The Window menu from the Map module is shown below. When you click **Window → Cross Section**, you return to that module. To return to the Main module, click **Window → Main**.



Opening the Tutorial Project

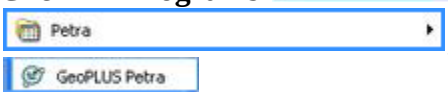
Open the Tutorial project with the following steps:

1. Click the **Start** button for Windows

.

   A Pop Up menu with choices is displayed.

2. Click **All Programs**

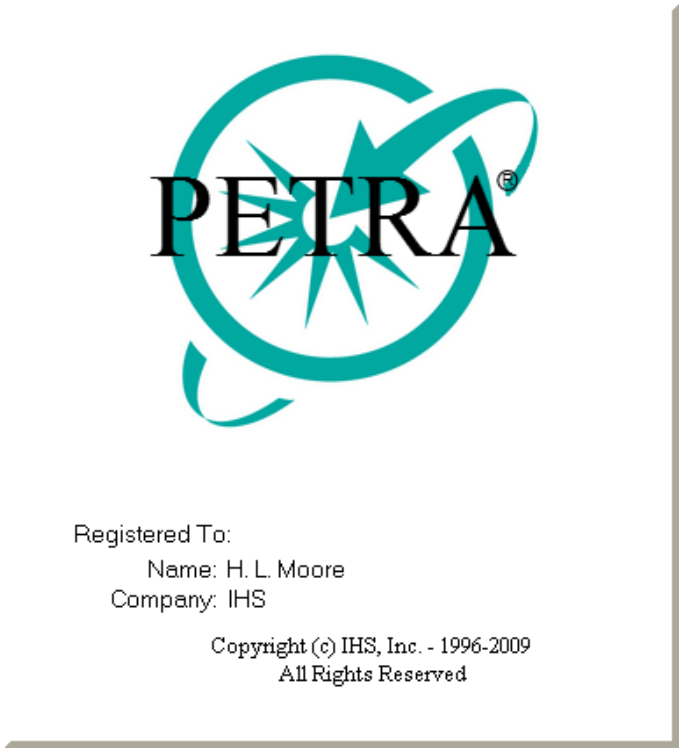
, and then **Petra**, 

, and then **GeoPlus Petra**.

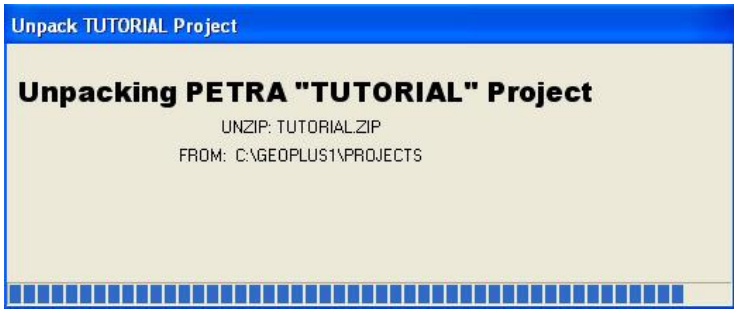
   Note: A shortcut created to run PETRA was placed on your desktop when PETRA was installed. You can click that shortcut to run PETRA.

   If you have created a shortcut to run PETRA, you can click that shortcut,

   The PETRA splash screen is displayed briefly. Wait until it disappears.



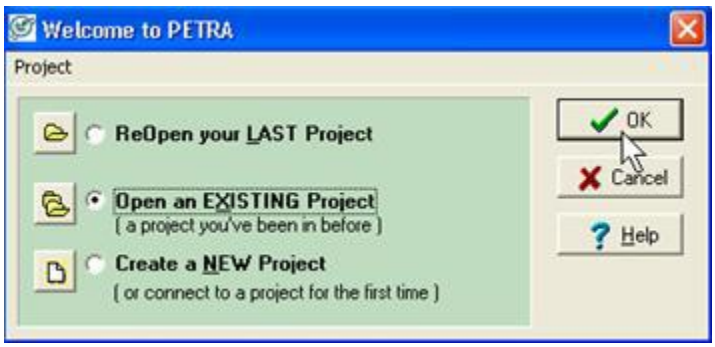
If this is the first time that you have opened PETRA, the following message is displayed:



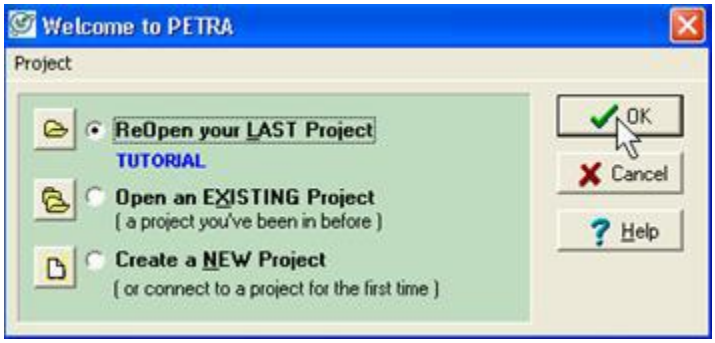
3. Click **OK** to continue.

   The ***Welcome to PETRA*** dialog screen is displayed.

4. Click the radio button to the left of **Open an EXISTING Project**.

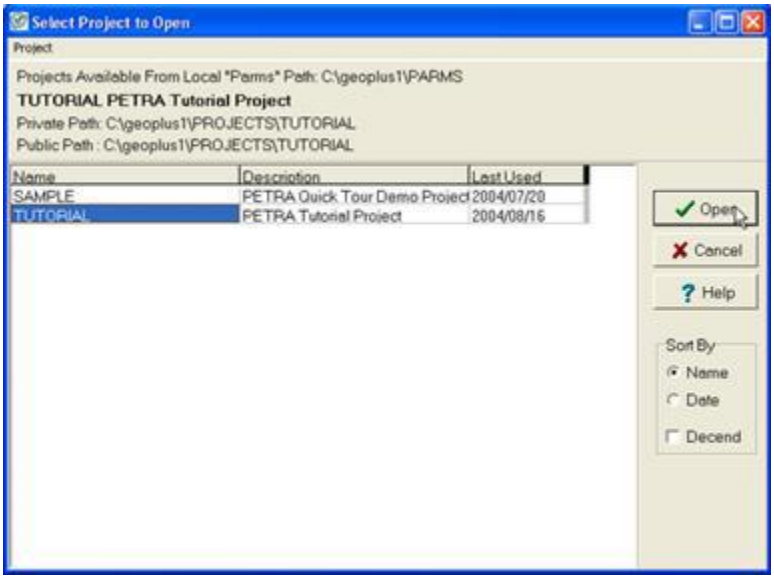


If you opened the Tutorial Project earlier, the ReOpen TUTORIAL Project radio button is turned on. The ReOpen radio button is always set to the last project that you were in when you shut PETRA down.

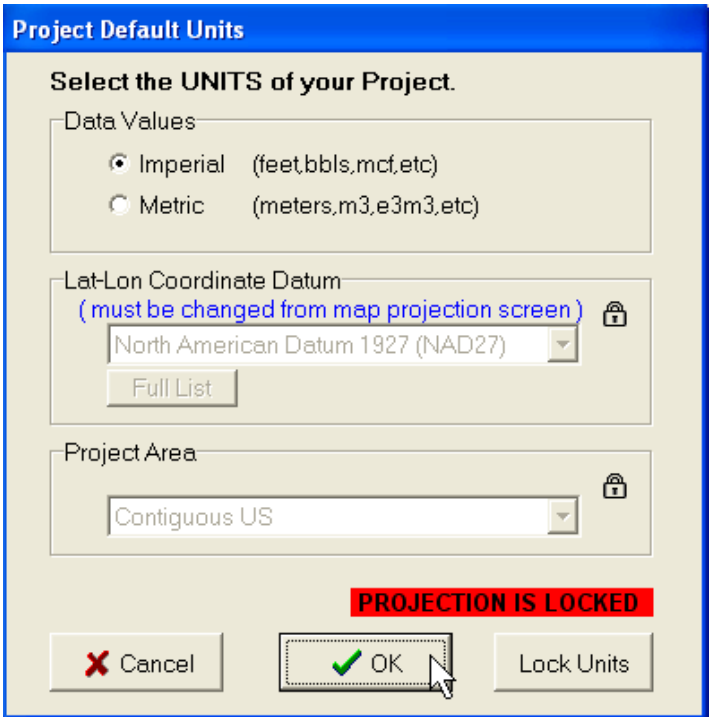


5. When the ***Select Project To Open*** dialog appears, either click the **TUTORIAL** project name, and then the **Open** button, or double-click the **TUTORIAL** project name to open

it.

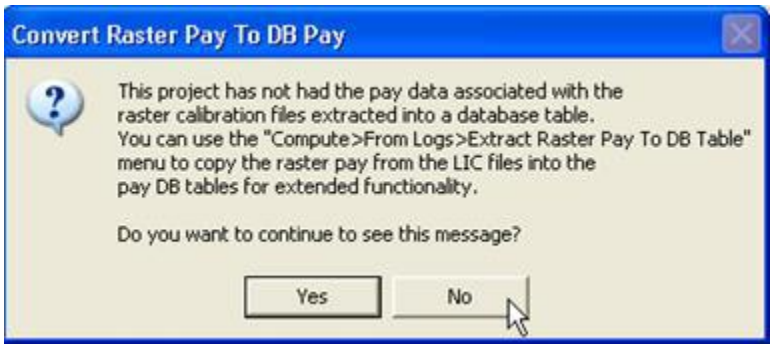


If this is the first time that the Tutorial project has been opened, the following dialog screen is displayed:



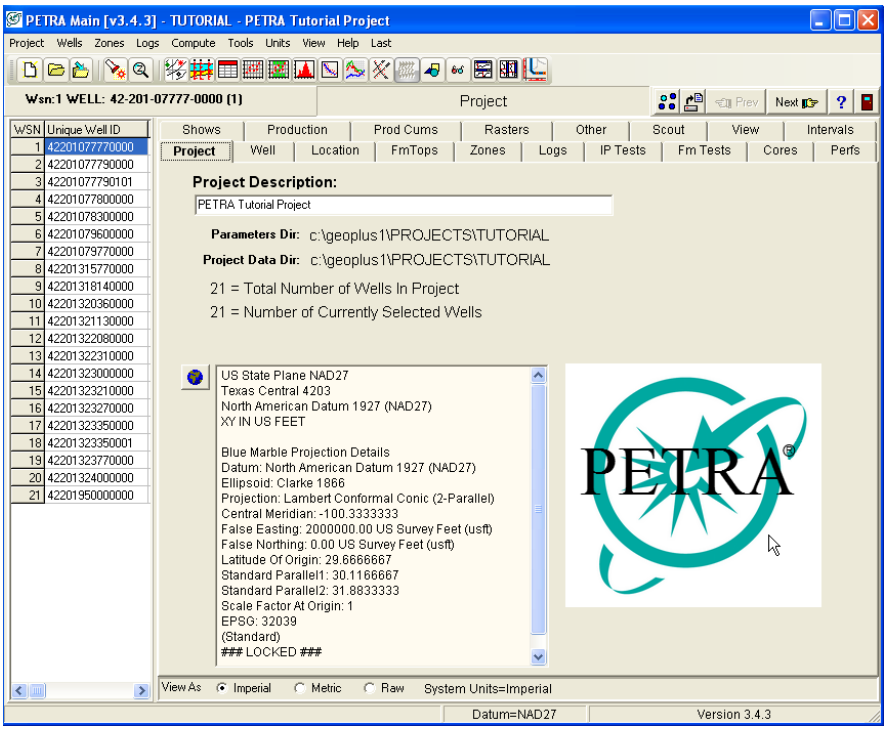
This project is in Imperial units. Click the **OK** button with the green check to accept the default selection. Do not change to Metric.

6. If the following dialog screen is displayed, click **No** as we have not picked any Raster Pay for this project.

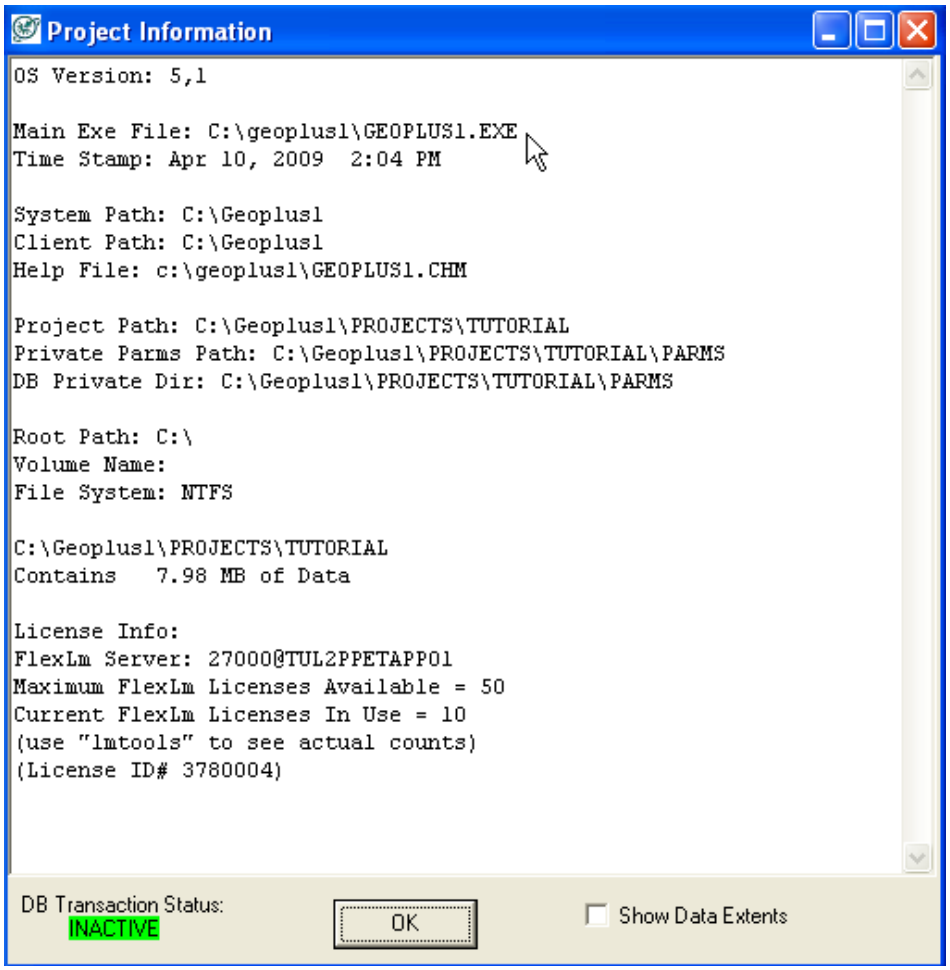

Convert Raster Pay To DB Pay
This project has not had the pay data associated with the raster calibration files extracted into a database table. You can use the "Compute>From Logs>Extract Raster Pay To DB Table" menu to copy the raster pay from the LIC files into the pay DB tables for extended functionality.
Do you want to continue to see this message?
Yes
No

The TUTORIAL project opens showing a list of wells. The Project tab of the Main Module is selected, and the projection information is displayed.

7. Click the **PETRA logo** to see the date and version, licensing and other miscellaneous information displayed in the ***About PETRA*** dialog screen. On the bottom right of the dialog screen you will see the Datum for the project and the Version number. The Version number is also displayed in the upper left of the ***PETRA Main*** dialog screen in brackets.



8. Click on the "Help>Project File Info…" menu to display information about the project as well as the date for the geoplus1.exe which is associated with the Version of PETRA. Other information of interest is displayed.



Main Module Overview

The PETRA Main module screen is organized into a list of wells on the left, and a series of tabs on the right. Each tabbed section displays details of a specific data type for the well highlighted in the well list.

Typing over the data displayed in the data entry fields modifies any data in the tabbed sections.

Each tabbed section contains a Save button

, or an Update button

, which must be clicked to update the database with any changes that are made. PETRA automatically prompts you to save the data if you change data and then click the left mouse button on another well or attempt to close the project without saving the changes.

Projection for projects

The projection for the project must be the first setting made before loading any data into the project.

Well locations are provided as either latitude-longitude or x-y coordinates. The following discussion on map projections is meant only to ensure your projects are set up correctly based on whether you have lat-lon or x-y data. It is not meant to explain the differences in the various map projections or datum's.

1. Click either the Main Module's **Project → Settings → Set Map Projection** menu option

   OR

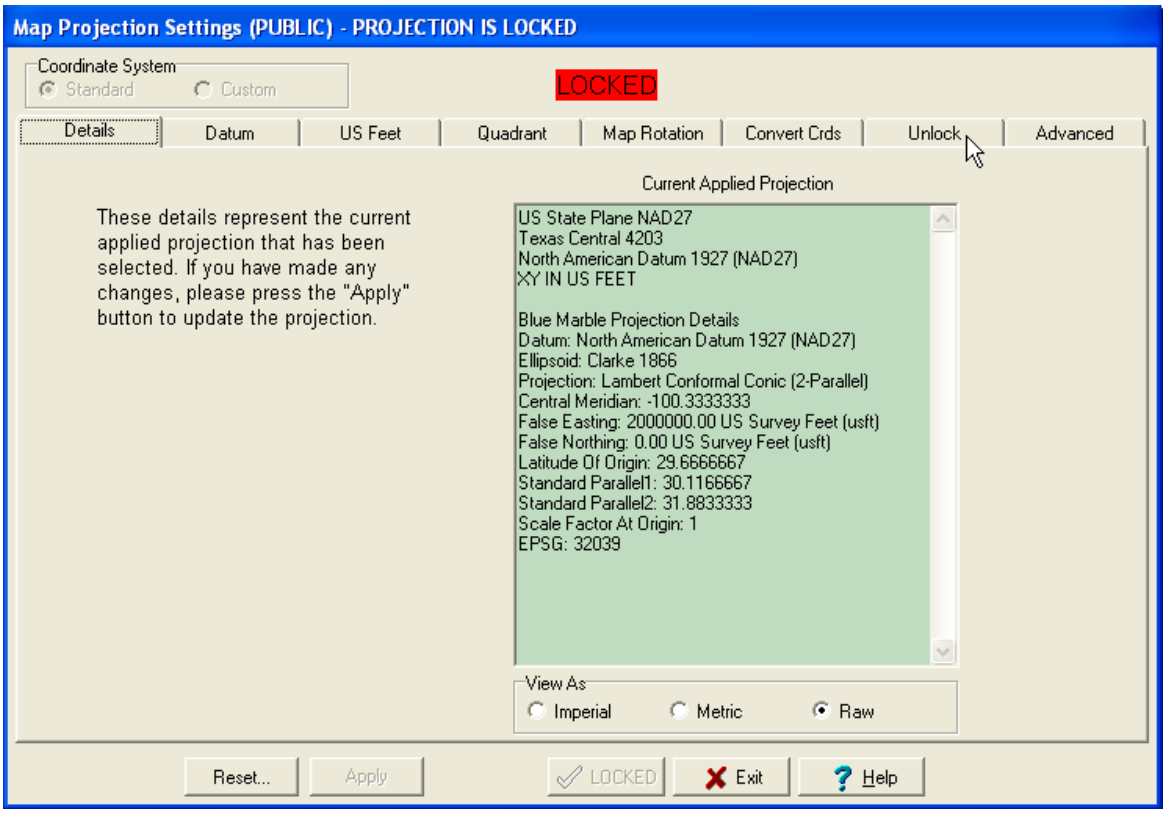
   from the Project tab, click the **Set Map Projection** button

   OR

   the **Location** tab.

2. Click the Projection button

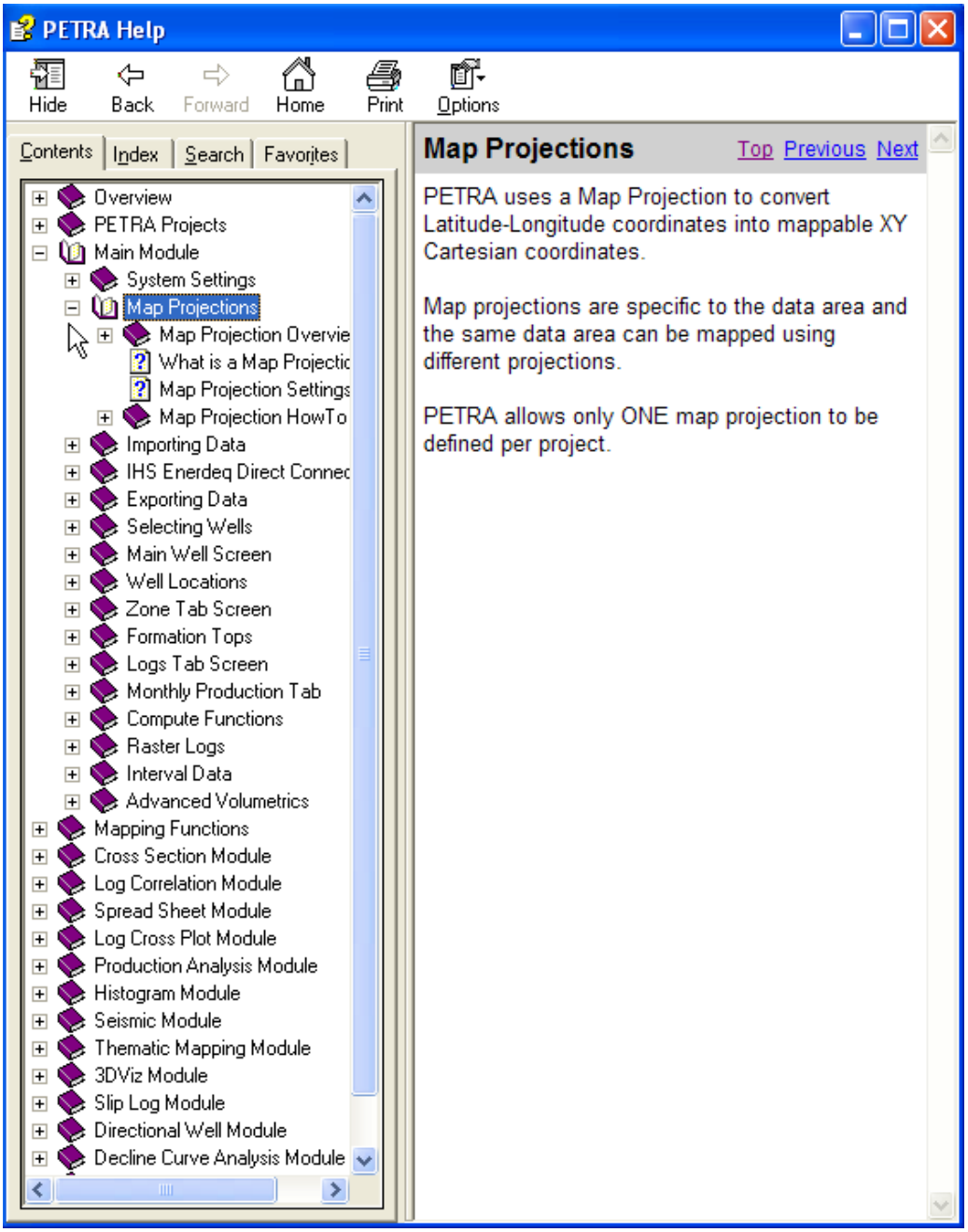
to display the Map Projection Settings dialog screen.



Note: The Projection Settings for the Tutorial project provided by IHS has been locked. To unlock the projection, click the **Unlock** tab. Click the **Unlock Map Projection** button. This will allow the different parameters to be displayed. Do not make any change to the parameters at this time.

PETRA operates in one of two coordinate modes. All well locations, seismic and other location data are stored as latitude-longitude or as x-y coordinates. You cannot have some wells with lat-lon and other wells with only x-y values. When lat-lon locations are stored, PETRA computes the x-y coordinate corresponding to the selected map projection. When x-y locations are stored, PETRA computes the lat-lon coordinate corresponding to the selected map projection, which has to be correct for the x-y coordinates that are loaded.

The Map Projection online help has extensive information explaining the various settings, datums, coordinate systems, and Datum Shift. Click the **Help** button at the bottom of the Map Projection Settings dialog screen to display the ***PETRA Help*** dialog screen.

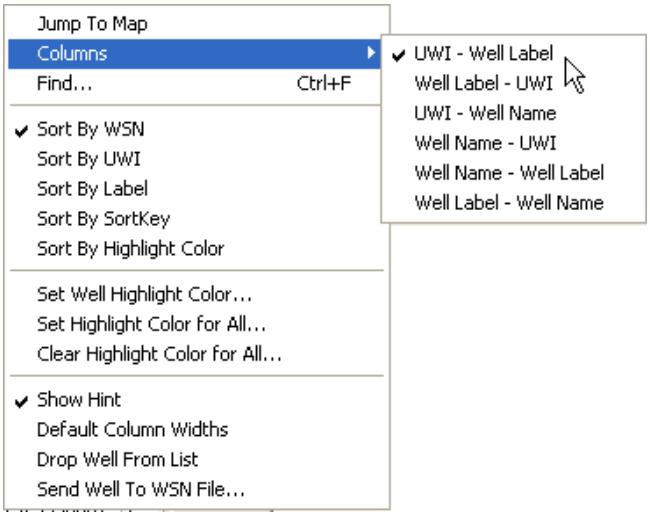


Note: If you've made any changes to the projection, click the **Cancel** button, as we do not want to change the map projection at this time.

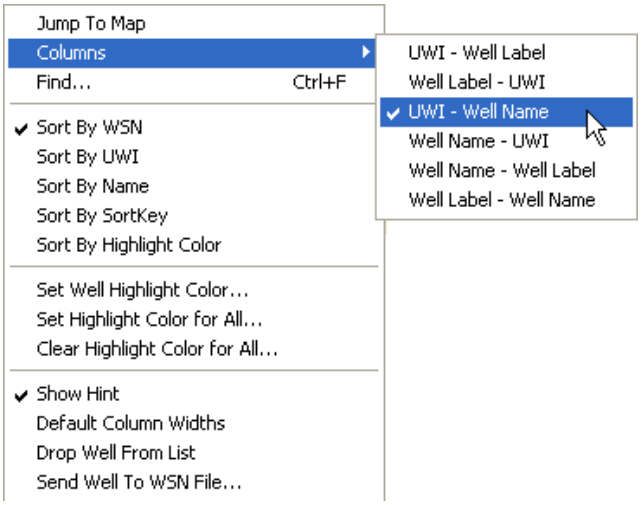
Sorting the Well List

The well list displays the well sequence used by the database, the unique well identifier (typically, the API number), and the custom well label. Try scrolling the list left and right to see the different fields.

The well list can be sorted by the UWI, WSN, Well Name, or Well Label. The default sort order is by WSN. Position the mouse cursor over the well list and click the right mouse button to display the pop up sort menu.



The check mark to the left of the sort option list indicates the last option chosen. To change to a different option, position the cursor over the desired option and click with the left mouse button. The well list is reloaded in the selected sort order.

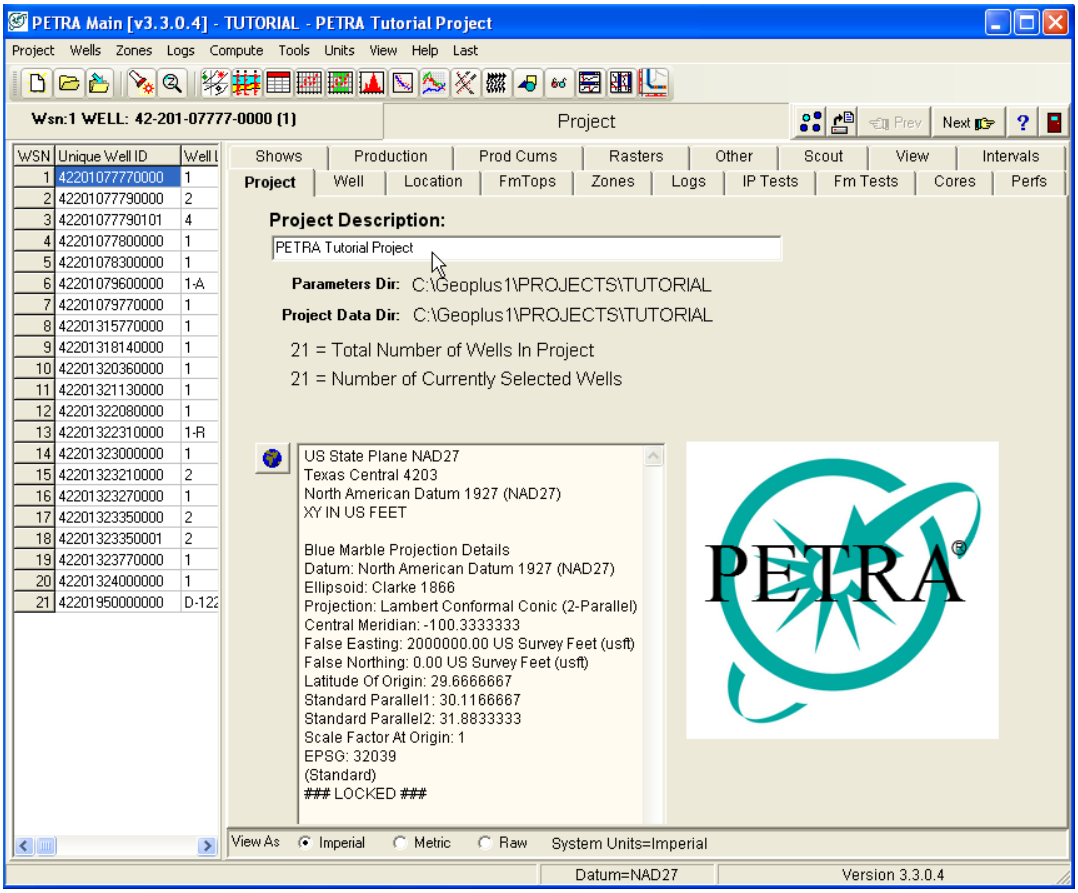


To change the columns and their display order, click the desired combination. The UWI and Well Label are the default columns. To sort on the Well Name, you need to click one of the column options that have the Well Name included for the Columns to be displayed as shown in the example above.

Project Tab

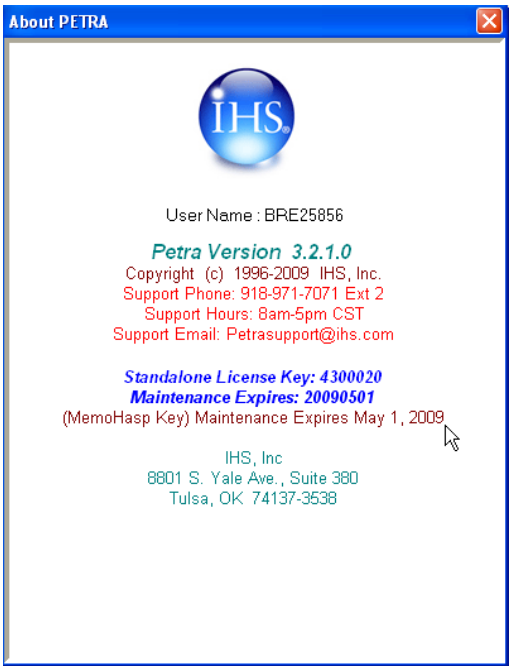
The Project tab section shows the Project Description, the Total Number of Wells stored in the project, and the Number of Currently Selected Wells in the main module. The selected wells are the wells displayed in the well list to the left of the Project tab. If you have changed to Prospect mode, the Total Number of Wells in Project is displayed as Total Number of Wells in Prospect.

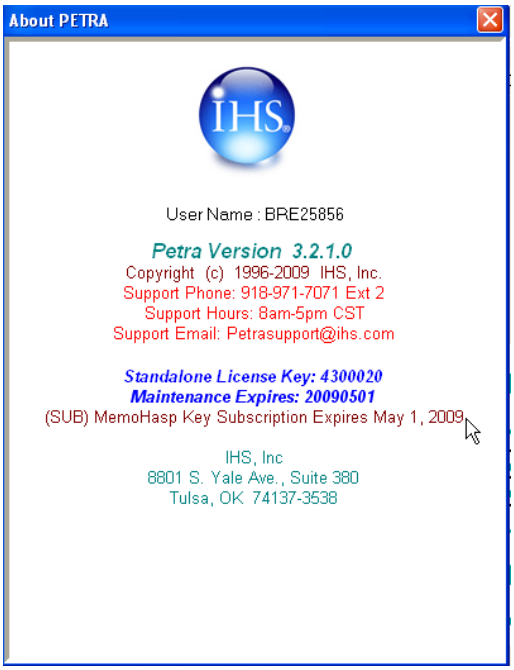
Typing over the description data that is displayed in the Project Description field modifies the project description. This change is written to the Project.ini file when the project is closed.



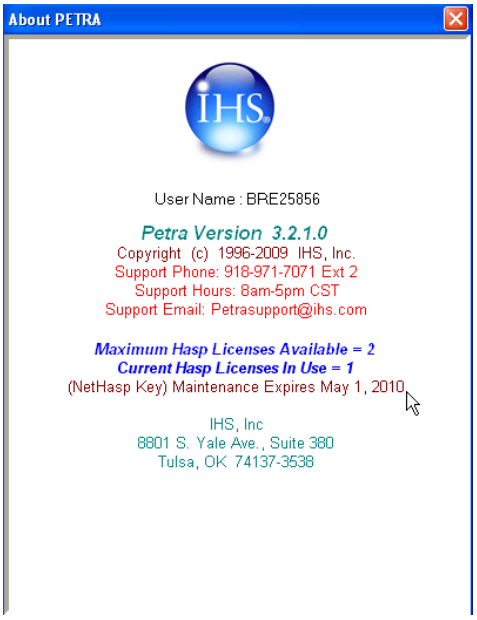
Click the **PETRA logo** to display information about PETRA.

The dialog screen on the left below displays the information for a Standalone License using a Memo Hasp Bitlock. The dialog screen on the right displays the information for a Subscription Standalone License using a Memo Hasp Bitlock.




About PETRA
User Name : BRE25856
Petra Version 3.2.1.0
Copyright (c) 1996-2009 IHS, Inc.
Support Phone: 918-971-7071 Ext 2
Support Hours: 8am-5pm CST
Support Email: Petrasupport@ihs.com
Standalone License Key: 4300020
Maintenance Expires: 20090501
(SUB) MemoHasp Key Subscription Expires May 1, 2009
IHS, Inc
8801 S. Yale Ave., Suite 380
Tulsa, OK 74137-3538

The dialog screen on the left below displays the information for a Network License using a Nethasp Bitlock. The dialog screen on the right displays the information for a Network license using FlexLM.


About PETRA
User Name : BRE25856
Petra Version 3.2.1.0
Copyright (c) 1996-2009 IHS, Inc.
Support Phone: 918-971-7071 Ext 2
Support Hours: 8am-5pm CST
Support Email: Petrasupport@ihs.com
Maximum Hasp Licenses Available = 2
Current Hasp Licenses In Use = 1
(NetHasp Key) Maintenance Expires May 1, 2010
IHS, Inc
8801 S. Yale Ave., Suite 380
Tulsa, OK 74137-3538

About PETRA
User Name : BRE25856
Petra Version 3.2.1.0
Copyright (c) 1996-2009 IHS, Inc.
Support Phone: 918-971-7071 Ext 2
Support Hours: 8am-5pm CST
Support Email: Petrasupport@ihs.com
Standalone License Key: 4300020
Maintenance Expires: 20090501
(SUB) MemoHasp Key Subscription Expires May 1, 2009
IHS, Inc
8801 S. Yale Ave., Suite 380
Tulsa, OK 74137-3538

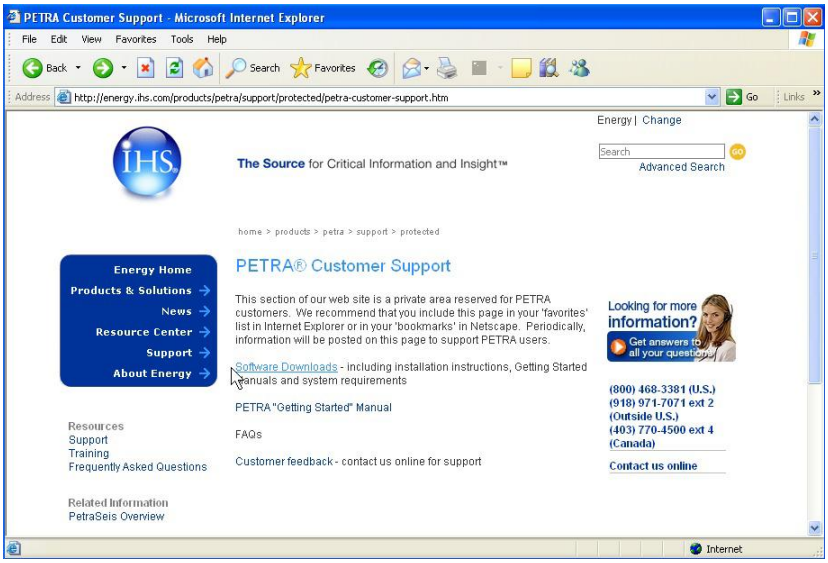
These are the same dialog screens that are shown when you click the **Help → About PETRA…** menu. Click the red X in the upper right corner of the dialog screen to close the ***About Petra*** dialog screen.

Note: The Version will change as PETRA is updated with new enhancements and bug fixes. Major releases of PETRA end in ".0". Minor releases will have the last digit of the version incremented as the major release is updated with enhancement and bug fixes since the last major release. As an example, the first minor release for version 3.2.1.0 will be 3.2.1.1.Major releases are every six to eight weeks apart on an average. PETRA Download link: Minor releases are made on an as needed basis. The enhancements and bug fixes are incremental. All files are included in both major and minor releases for updating PETRA to the latest version.

PETRA Download link:

http://energy.ihs.com/products/petra/support/protected/petra-customer-support.htm

Click the **Software Download** link to select the appropriate file to download for the installation or update of PETRA.


PETRA Customer Support - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://energy.ihs.com/products/petra/support/protected/petra-customer-support.htm
Go Links
Energy | Change
The Source for Critical Information and Insight™
Search
Advanced Search
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Energy Home
Products & Solutions
News
Resource Center
Support
About Energy
PETRA® Customer Support
This section of our web site is a private area reserved for PETRA customers. We recommend that you include this page in your 'favorites' list in Internet Explorer or in your 'bookmarks' in Netscape. Periodically, information will be posted on this page to support PETRA users.
Software Downloads - including installation instructions, Getting Started manuals and system requirements
PETRA "Getting Started" Manual
FAQs
Customer feedback - contact us online for support
Looking for more information?
Get answers to all your questions
(800) 468-3381 (U.S.)
(918) 971-7071 ext 2
(Outside U.S.)
(403) 770-4500 ext 4
(Canada)
Contact us online
Resources
Support
Training
Frequently Asked Questions
Related Information
PetraSeis Overview
Internet

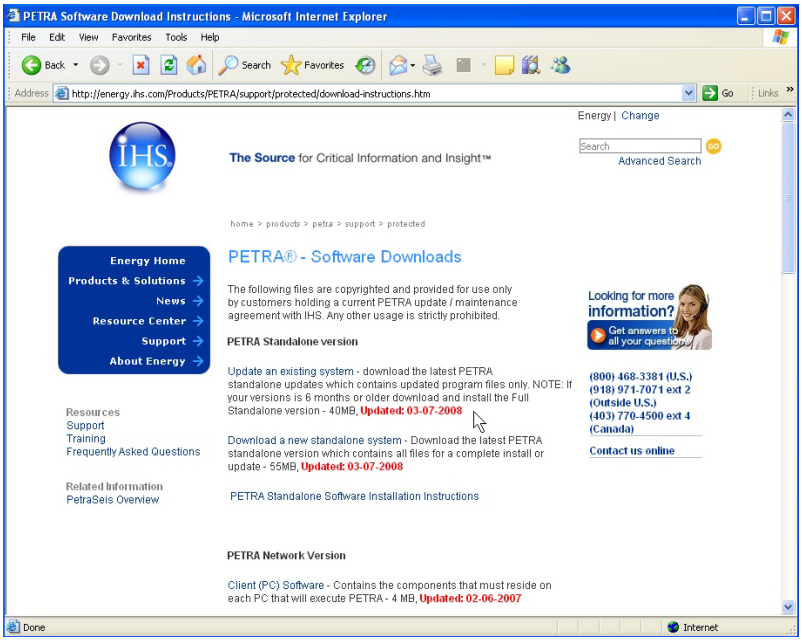
Click the **Software Downloads** link. The following WEB page is displayed with the dates displayed when the WEB was last updated.

For standalone version of PETRA, you can turn on a switch to automatically detect when there is a new version available on the WEB. In the geoplus.ini file you add a keyword SKIPUPDATECHECK=0 to the [STARTUP] section of the ini file. Use notepad.exe to edit the file as there are no extra line fees and end of file characters added with this editor.

For a network/client version of PETRA, we do not recommend turning to this option. The IT administrator will determine when new updates are installed.

Note: The dates displayed are entered manually; therefore, the dates on these pages may not reflect the actual date of the files that have been uploaded to the Web.

To view the actual dates for the following files: alldisks.exe, server.exe, PSVer2.exe, petramultienv.pdf, and client.exe – go to https://petraftp.ihsenergy.com/petrafiles.txt. The dates shown will be when the files were last uploaded to the Web.


PETRA Software Download Instructions - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://energy.ihs.com/Products/PETRA/support/protected/download-instructions.htm
Go Links
Energy | Change
The Source for Critical Information and Insight™
Search
Advanced Search
home > products > petra > support > protected
Energy Home
Products & Solutions
News
Resource Center
Support
About Energy
PETRA® - Software Downloads
The following files are copyrighted and provided for use only by customers holding a current PETRA update / maintenance agreement with IHS. Any other usage is strictly prohibited.
PETRA Standalone version
Update an existing system - download the latest PETRA standalone updates which contains updated program files only. NOTE: If your versions is 6 months or older download and install the Full Standalone version - 40MB, Updated: 03-07-2008
Download a new standalone system - Download the latest PETRA standalone version which contains all files for a complete install or update - 55MB, Updated: 03-07-2008
PETRA Standalone Software Installation Instructions
PETRA Network Version
Client (PC) Software - Contains the components that must reside on each PC that will execute PETRA - 4 MB, Updated: 02-06-2007
Looking for more information?
Get answers to all your questions
(800) 468-3381 (U.S.)
(918) 971-7071 ext 2
(Outside U.S.)
(403) 770-4500 ext 4
(Canada)
Contact us online
Resources
Support
Training
Frequently Asked Questions
Related Information
PetraSeis Overview
Done
Internet

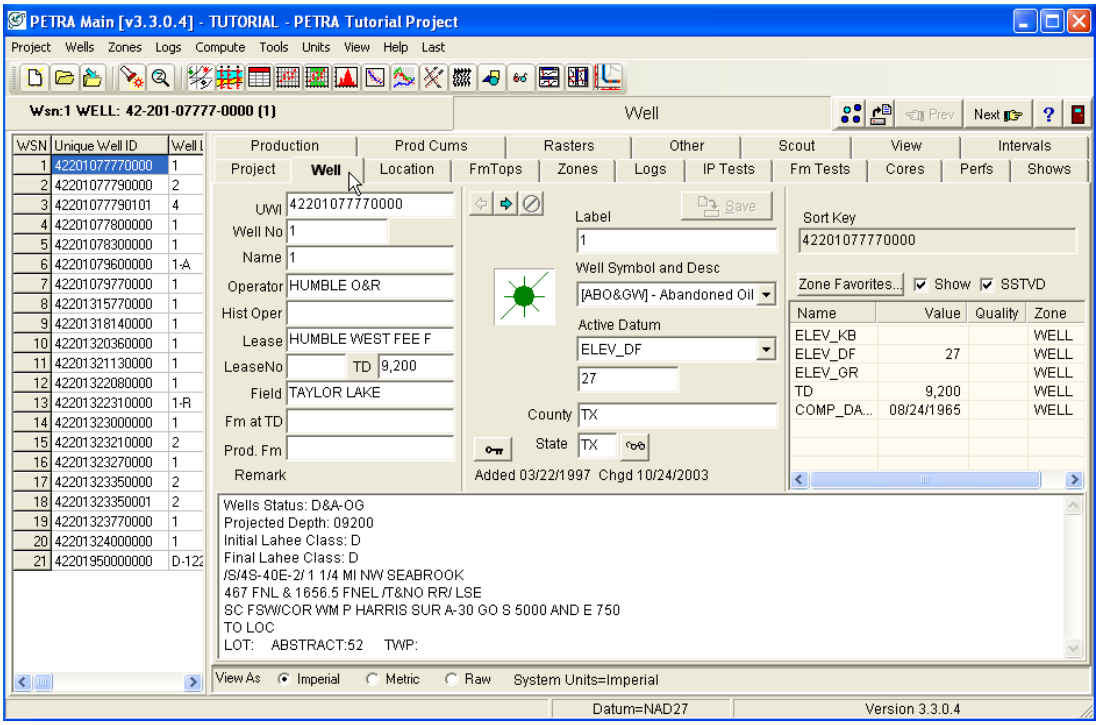
For standalone version of PETRA, you can turn on a switch to automatically detect when there is a new version available on the Web. In the geoplus.ini file, you add a keyword SKIPUPDATECHECK=0 to the [STARTUP] section of the ini file. Use notepad.exe to edit the file as there are no extra line feeds and end of file characters added with this editor.

For a network/client version of PETRA, we do not recommend turning on this option. The IT administrator will determine when new updates are installed.

Note: We do not recommend turning on this switch if you have a mixture of standalone and network/client users. You cannot open PETRA projects using different versions due to the possibility of table modifications for newer versions.

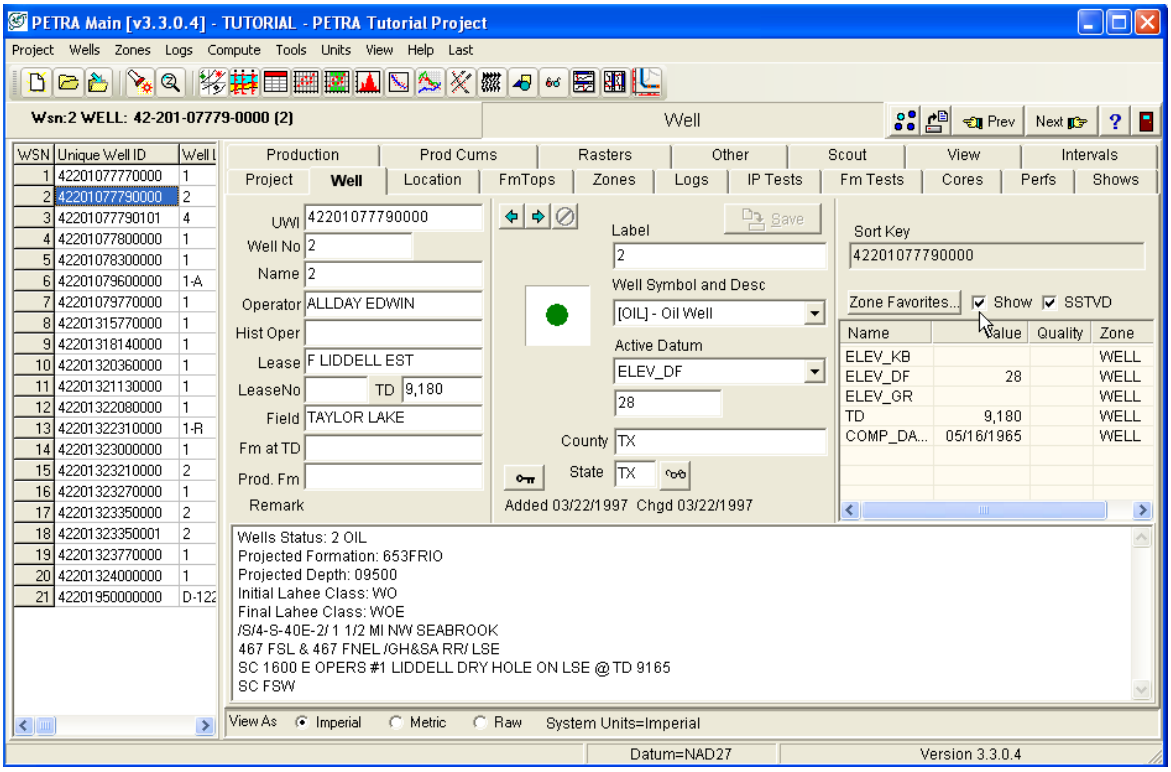
Well Tab

On the ***Main*** dialog screen, click the **Well** tab.



The Well tab shows the well header detail information for the well highlighted in the well list. The screen includes data fields for *Unique Well ID* (UWI), *Well Number*, *Well Name*, *Operator*, *Label*, *Lease Name*, *Lease Number*, etcetera.

When you pull the Main screen wider and resize the window splitters, you see the date the well was added and last changed. When you click the check box to the right of **Zone Favorites**, you can select and display information from other tables on this screen. For instance, you can display the KB, DF, GR, TD, and Completion Date from the Well table to see the data values that are stored in the table displayed in this area.



You can change to a different well by clicking in the **Unique Well ID** column of the well list, by clicking the **Next** and **Previous** buttons , or by clicking the **Previous Well** or **Next Well** buttons located to the right of the *UWI* display data field.

Typing over the current value modifies any of the well data fields. As you type, the Save button becomes active, indicating you have the option to update the database with your changes. After making all necessary changes to the Well tab screen, click **Save.** . If you modify any data fields and attempt to go to another well without first saving the data, PETRA prompts you to save the data.

If you click **Save** but realize you made a mistake, click the **Undo** icon to reset the well to the values prior to the last save. To see how this works, select the first well in the well list and change the historical operator name by typing **Big Oil Company** in the *Hist Oper* field. Next, click **Save.** . If you have a sound card enabled on your system, you hear a sound as the data is updated. Next, click the **Undo** icon. The well data resets to the prior values.

The well symbol displayed on maps and cross sections is shown on the Well tab screen. Choosing one of the symbols listed in the Well Symbol and Desc list box changes the symbol.

There are currently 238 symbols to choose from. Again, click **Save** to store your changes.

The Active Datum list allows you to choose a datum elevation from several predefined fields including Kelly bushing (ELEV_KB), derrick floor (ELEV_DF), ground level (ELEV_GR), and seismic datum (ELEV_SEIS). The datum elevation is used to compute subsea formation tops or other depths at run-time. Each well can reference a different elevation. The actual elevation data values can be viewed and edited on the Zones tab screen, where the datum elevations are listed under the WELL zone; on the FmTops tab, where the datum elevation is shown above the tops, and on the Well tab in the Active Datum data field.

The Remarks section, on the Well tab, provides a place to store any general comments about a well. This section is also used to store various remarks imported from commercial well data sources.

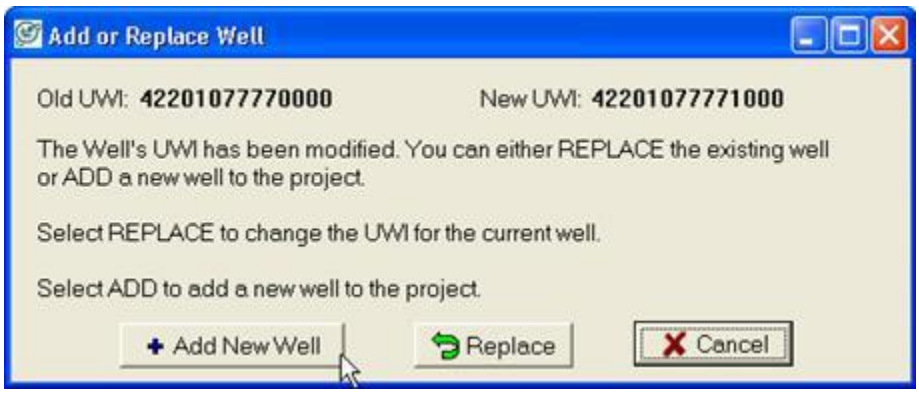
Adding a new well manually

Wells can be added manually to a project using several methods. From the Well tab screen you can add a well by typing a new UWI and all associated well header information. Then click **Save.** . PETRA detects the attempt to change the UWI and displays the Add or Replace Well screen. At this point, you can click the **Add New Well** button to add the new well to the database.

Try adding a new well.

1. Change the first well's UWI field from 42201077770000 to 42201077771000.
2. Click **Save.** .

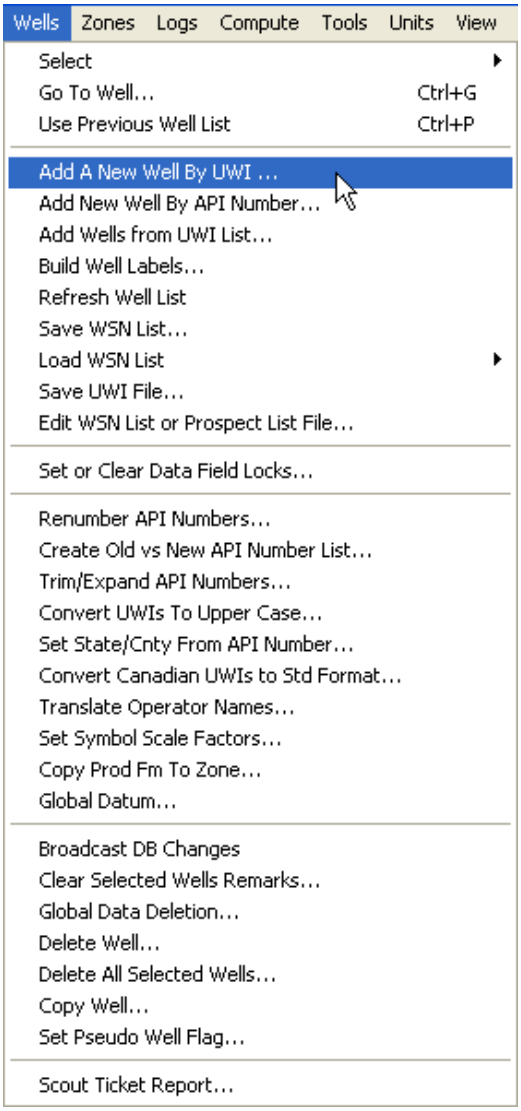
   The following screen appears.


Add or Replace Well
Old UWI: 42201077770000
New UWI: 42201077771000
The Well's UWI has been modified. You can either REPLACE the existing well or ADD a new well to the project.
Select REPLACE to change the UWI for the current well.
Select ADD to add a new well to the project.
Add New Well
Replace
Cancel

3. Click the Add New Well option.

   The new well appears at the end of the well list.

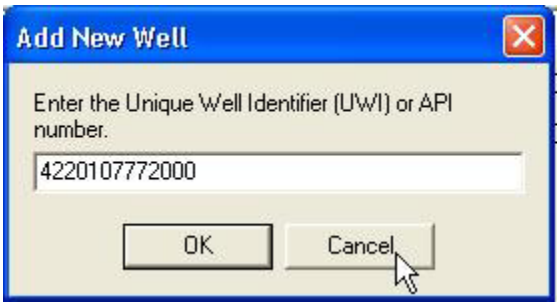
   Note: Wells can also be added using the main screen's Wells → Add A New Well menu.



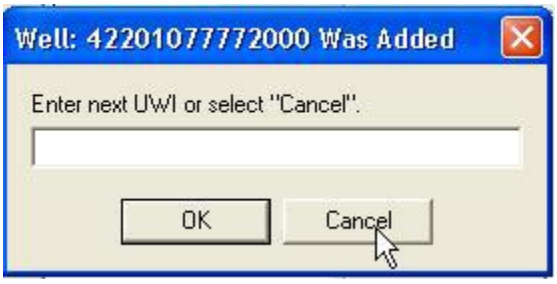
   You are prompted for the UWI for the new well.

4. Enter the new UWI and press **OK** to actually add a new well into the database.

Shown below is the dialog screen for entering the API number for this menu item. Do not actually enter this API into the well database. Click **Cancel**.



You can add more wells by entering more UWIs or click **Cancel** when done. If you actually add a well, you see the last well UWI that was added at the bottom of the dialog screen. The well list is repositioned as the last well added to the project. You can then update the well header fields for each of the newly added wells.



Changing the Unique Well Identifier

Change the Unique Well Identifier for a well from the Well tab screen.

1. Type over the *UWI* field, and then click **Save.**

   The Add or Replace Well screen appears to prompt you.

2. Click **Replace** to change the UWI for the selected well.
3. Change the *UWI* field of our new well from 42201077771000 to 42201077771001.
4. At the add or replace prompt, click **Replace**.

   The new well is updated with the new UWI. To see the change in the display, you may need to click the well above and then back on the new well. This causes the database tables to be refreshed.

5. Try replacing the UWI with that of another well. Notice that PETRA does not allow two wells with the same UWI.
6. Click **OK** to close the ***Error*** dialog screen.

Deleting a single well

You can delete a single well from the database using the Wells → Delete Well… menu item.

1. First, click the well list to highlight the well you want to delete. Select the new well we added in the last section.
2. Pull down the Wells Menu and click the **Delete Well…** menu item.

   You are prompted twice to verify that you really want the well and all of its data deleted from the database. After the well is deleted, the screen resets to the Project tab showing the number of wells in the project and who a total of 21 wells and 21 wells selected. The well you deleted is no longer in the well list.

Deleting multiple wells

Note: Read through the following section, but do not actually delete the Tutorial wells for now.

To delete more than one well at a time,

1. Select the wells to be deleted using one of the well selection tools such as the **Wells → Select → Wells By Data Criteria** menu item.
2. Choose the **Wells → Delete All Selected Wells** menu item.

Caution: This option deletes all of the wells displayed in the well list on the left side of the Main screen.

However, you are prompted twice to verify that you really want to delete these wells. After deletion, the screen resets the Project tab to show the number of wells in the project, and all remaining wells in the project show as selected.

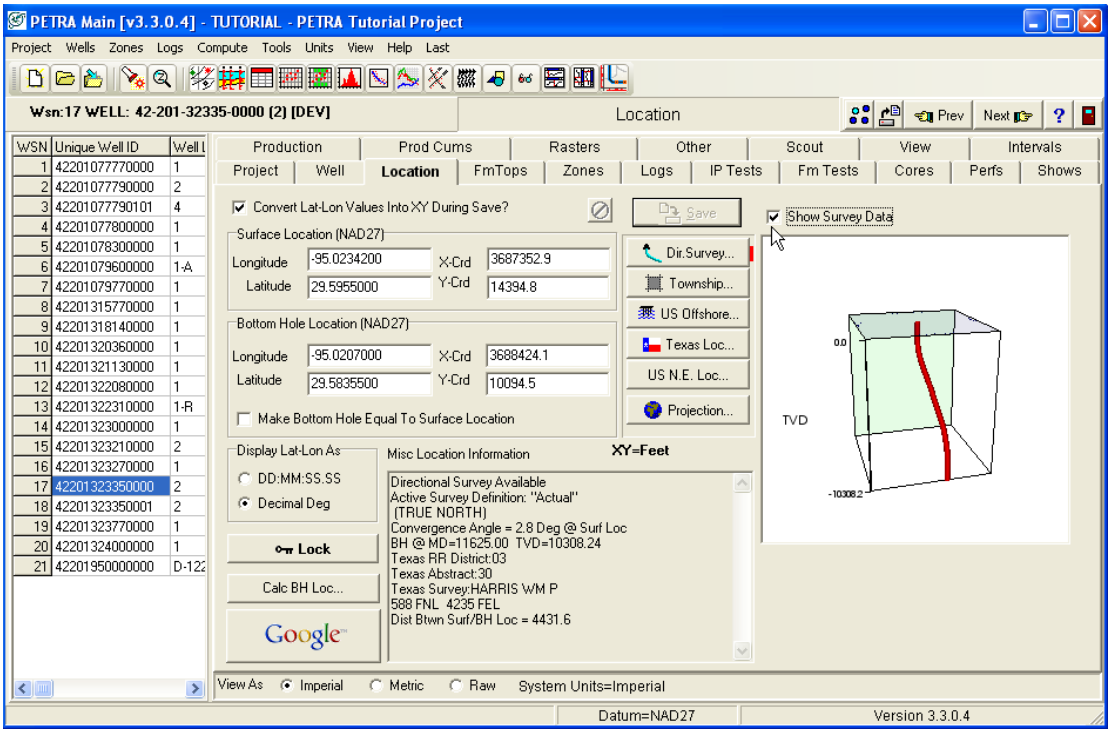
Note: Always make sure that you have the correct wells selected for deletion before using this option.

Location Tab

From the Main screen, click the **Location** tab.

When there is directional survey data for the well, you see Directional Survey Available listed in the Misc Location Information data area at the bottom, middle of the screen. You are also able to select the Show Survey Data option to display the survey data graphically.

Click **WSN 17** and check the **Show Survey Data** option to see this graphical display.



The Location screen displays the well's surface and bottom hole latitude-longitude and x-y coordinates. You also have access to region-specific, detailed-location data using a series of buttons located on the right side of the screen. Detail screens are provided for Directional Survey Data, Section-Township-Range Data, Offshore Location Information (Gulf of Mexico Data), Texas Location Data, North East Location Data, and Projection Settings (Map Projection Data).

Deviated wells

Directional or deviated wells are wells that contain directional survey data describing the coordinates of the borehole at various depths. PETRA queries the database for the presence of directional survey data to determine whether or not a well is deviated. Directional surveys can be imported or entered by hand as MD, TVD, Dip and Azimuth, or as MD, TVD, X-offset and Y-offset. The radius of curvature method is applied to convert dip and azimuth to x and y offsets.

Deviated wells are treated differently than non-deviated wells. For example, during mapping, a deviated well's symbol location is determined by projecting the deviated borehole path onto the map surface. The well symbol is positioned along this path at a predetermined depth. This depth can be the total depth of the well or a depth of a formation top. The surface projection of the borehole is sometimes referred to as a worm track or spider diagram. On cross sections, the deviated path of the borehole is projected onto the plane of the cross section. Digital log curves, tops, and tests are plotted relative to the angled borehole.

Displaying the survey data

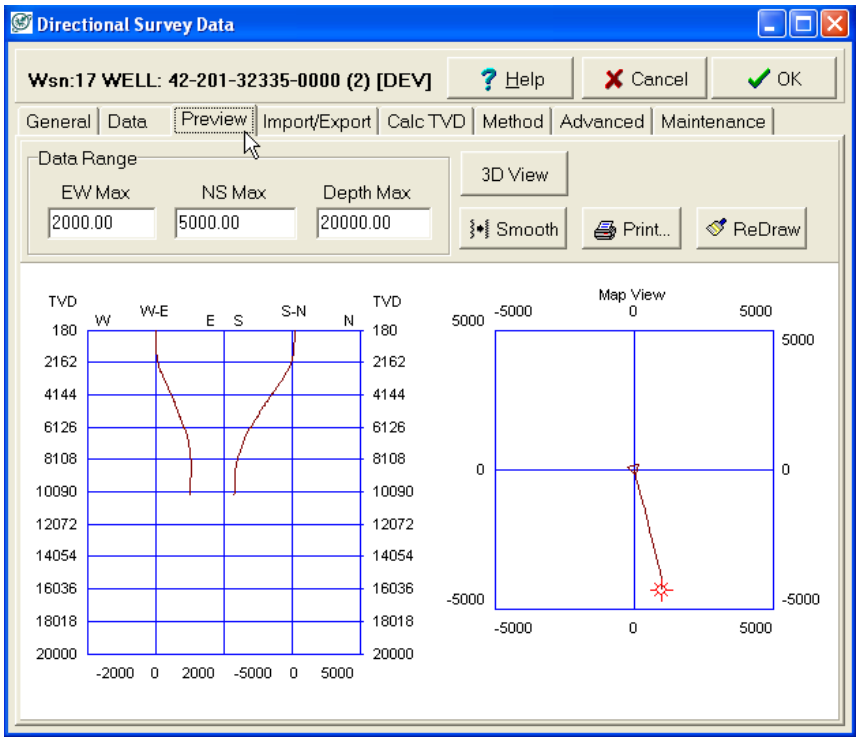
To display survey data from the Location tab screen,

1. Click the **WSN=17** on the WSN list. This is a directional well as indicated by the remark Directional Survey Available in Misc Location Information in the bottom, middle section of the screen.
2. Click the Dir Survey button on the Location tab to access the survey data details.

   The system displays the Directional Survey Data screen.

The survey screen contains a series of tabs:

- The General tab shows remarks and provides a utility to convert depths from measured depth to TVD and vice versa.
- The Data tab shows the survey data in spreadsheet format. The data can be added or modified from this spreadsheet.
- The Preview tab shows a plotted graphical representation of the survey data. On the left is a graph showing the East-West and North-South components of the survey footage offsets from the surface location. The y axis is TVD and can be adjusted by changing the Max Depth field and clicking the Redraw button. The right graph shows a map view of the survey worm or spider plot. The axes are in feet (or optionally, meters) on the earth's surface.



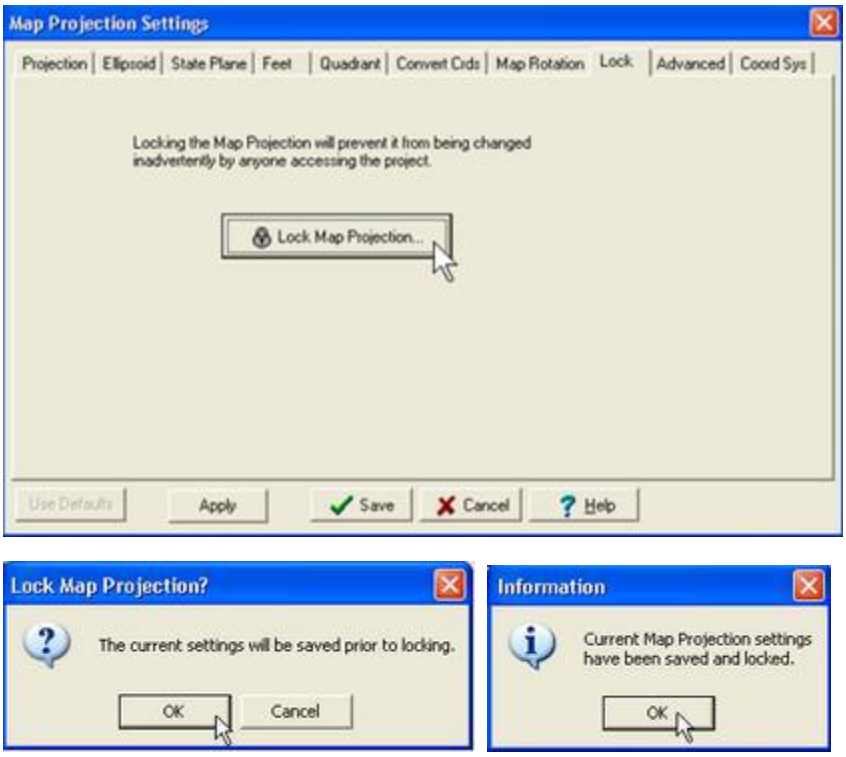
- The Import/Export tab allows the data to be imported from or exported to an ASCII file.

Note: Click the **Cancel** button to close the survey screen without making any updates to the database.

Locking projection

To use locking projection

1. Click either the Main Module's **Project → Settings → Set Map Projection** menu option, or from the Project tab, click the **Set Map Projection** button , or on the **Location** tab, click the **Projection** button Projection... to display the ***Map Projection Settings*** dialog screen.
2. Click the **Lock** tab, click the ***Map Projection Settings*** dialog screen, and then click the **Lock Map Projection...** button.
3. Click the **OK** button on the ***Lock Map Projection?*** confirmation screen and then on the **OK** button on the ***Information*** screen that is displayed.

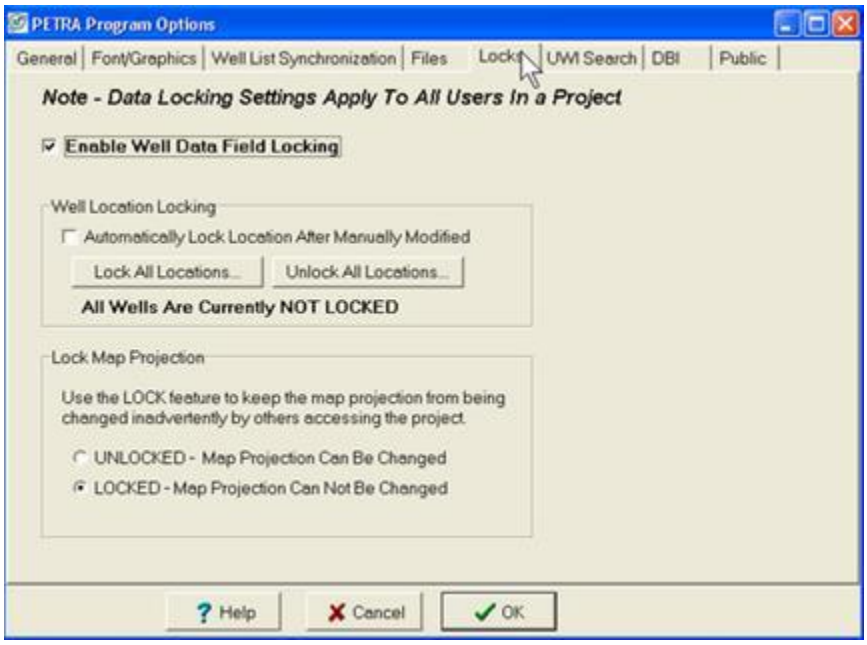


Locking locations

To lock the locations for the wells

1. Click the **Project → Settings…→ Program Options…** menu.

   The ***PETRA Program Options*** dialog screen is displayed.

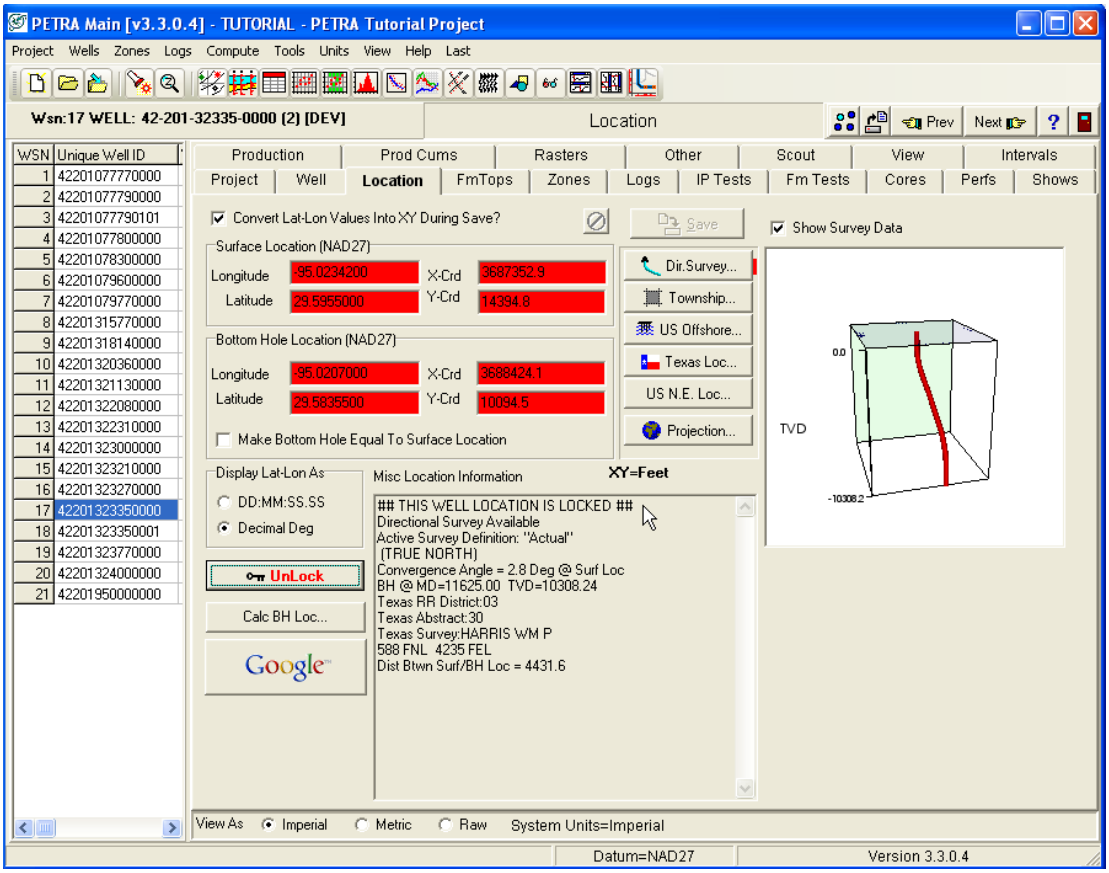

PETRA Program Options
General
Font/Graphics
Well List Synchronization
Files
Locks
UWI Search
DBI
Public
Note - Data Locking Settings Apply To All Users In a Project
Enable Well Data Field Locking
Well Location Locking
Automatically Lock Location After Manually Modified
Lock All Locations...
Unlock All Locations...
All Wells Are Currently NOT LOCKED
Lock Map Projection
Use the LOCK feature to keep the map projection from being changed inadvertently by others accessing the project.
UNLOCKED - Map Projection Can Be Changed
LOCKED - Map Projection Can Not Be Changed
Help
Cancel
OK

2. Click the **Locks** tab.
3. Click the check box to the left of **Enable Well Data Field Locking**.
4. Click the **Lock All Locations...** button.

   The following dialog screen is displayed:

5. Click **OK**.
6. Click the **OK** button with the green check at the bottom of the ***PETRA Program Options*** dialog screen.

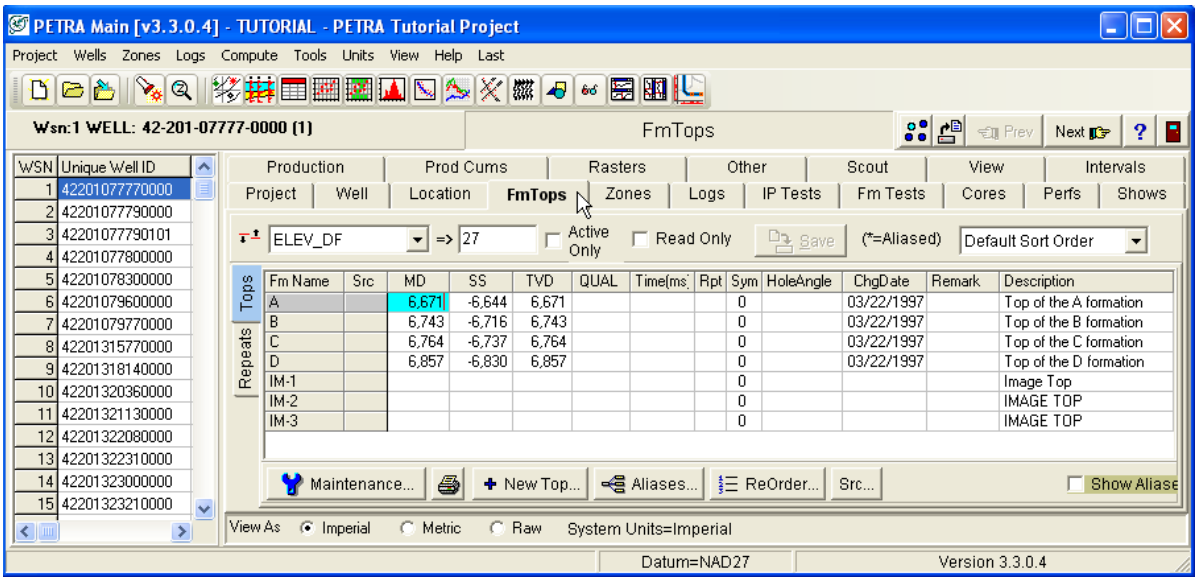
When you click the **Locations** tab, the locations are displayed in Red, and a message is displayed in the Misc Location Information field at the bottom, middle of the screen that states that "## ALL OF THE LOCATIONS ARE LOCKED AT THE PROJECT LEVEL ##"


PETRA Main [v3.3.0.4] - TUTORIAL - PETRA Tutorial Project
Project Wells Zones Logs Compute Tools Units View Help Last
Wsn:17 WELL: 42-201-32335-0000 (2) [DEV]
Location
Prev
Next
WSN Unique Well ID
1 42201077770000
2 42201077790000
3 42201077790101
4 42201077800000
5 42201078300000
6 42201079600000
7 42201079770000
8 42201315770000
9 42201318140000
10 42201320360000
11 42201321130000
12 42201322080000
13 42201322310000
14 42201323000000
15 42201323210000
16 42201323270000
17 42201323350000
18 42201323350001
19 42201323770000
20 42201324000000
21 42201950000000
Production
Prod Cums
Rasters
Other
Scout
View
Intervals
Project
Well
Location
FmTops
Zones
Logs
IP Tests
Fm Tests
Cores
Perfs
Shows
Convert Lat-Lon Values Into XY During Save?
Save
Show Survey Data
Surface Location (NAD27)
Longitude -95.0234200
Latitude 29.5955000
X-Crd 3687352.9
Y-Crd 14394.8
Bottom Hole Location (NAD27)
Longitude -95.0207000
Latitude 29.5835500
X-Crd 3688424.1
Y-Crd 10094.5
Make Bottom Hole Equal To Surface Location
Dir.Survey...
Township...
US Offshore...
Texas Loc...
US N.E. Loc...
Projection...
TVD
0.0
-10308.2
Display Lat-Lon As
DD:MM:SS.SS
Decimal Deg
UnLock
Calc BH Loc...
Google
Misc Location Information
XY=Feet
THIS WELL LOCATION IS LOCKED
Directional Survey Available
Active Survey Definition: "Actual"
(TRUE NORTH)
Convergence Angle = 2.8 Deg @ Surf Loc
BH @ MD=11625.00 TVD=10308.24
Texas RR District:03
Texas Abstract:30
Texas Survey:HARRIS WM P
588 FNL 4235 FEL
Dist Btwn Surf/BH Loc = 4431.6
View As Imperial Metric Raw System Units=Imperial
Datum=NAD27
Version 3.3.0.4

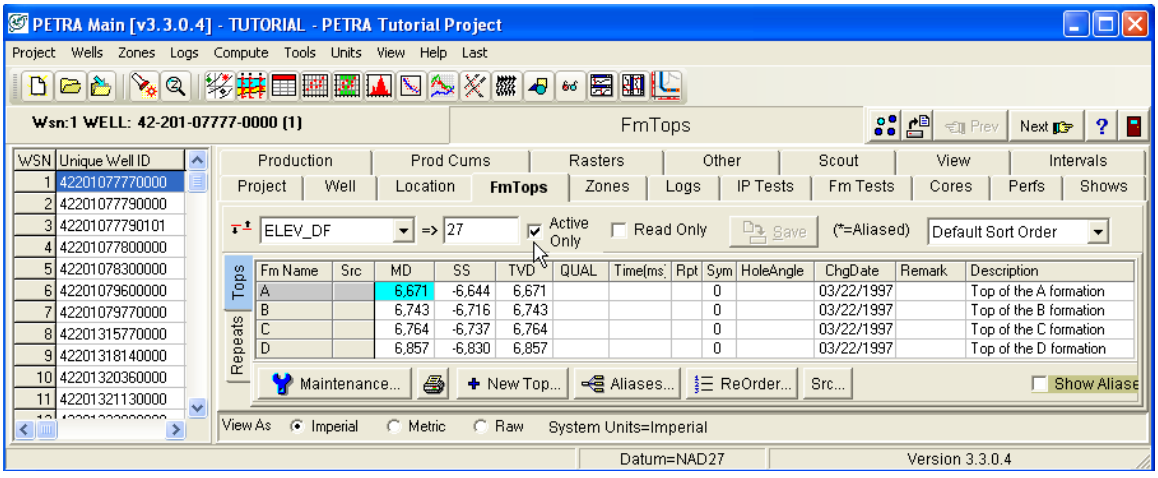
Fm Tops Tab

To use Fm Tops, from the Main screen, click the **FmTops** tab

.


PETRA Main [v3.3.0.4] - TUTORIAL - PETRA Tutorial Project
Project Wells Zones Logs Compute Tools Units View Help Last
Wsn:1 WELL: 42-201-07777-0000 (1)
FmTops
Prev
Next
Production Prod Cums Rasters Other Scout View Intervals
Project Well Location FmTops Zones Logs IP Tests Fm Tests Cores Perfs Shows
ELEV_DF => 27 Active Only Read Only Save (*=Aliased) Default Sort Order
Tops
Repeats
Fm Name Src MD SS TVD QUAL Time(ms) Rpt Sym HoleAngle ChgDate Remark Description
A 6,671 -6,644 6,671 0 03/22/1997 Top of the A formation
B 6,743 -6,716 6,743 0 03/22/1997 Top of the B formation
C 6,764 -6,737 6,764 0 03/22/1997 Top of the C formation
D 6,857 -6,830 6,857 0 03/22/1997 Top of the D formation
IM-1 0 Image Top
IM-2 0 IMAGE TOP
IM-3 0 IMAGE TOP
Maintenance... New Top... Aliases... ReOrder... Src... Show Aliase
View As Imperial Metric Raw System Units=Imperial
Datum=NAD27
Version 3.3.0.4

PETRA stores all formation tops, bases, fluid contacts, or markers in the FmTops table. This tutorial refers to any data item stored in the FmTops table as a top. Tops can be viewed and edited as either measured depth or subsea TVD; however, the database stores all tops as a measured depth. Subsea (subdatum) or TVD values are computed when needed using datum elevations and directional surveys.


PETRA Main [v3.3.0.4] - TUTORIAL - PETRA Tutorial Project
Project Wells Zones Logs Compute Tools Units View Help Last
Wsn:1 WELL: 42-201-07777-0000 (1)
FmTops
Prev
Next
Production Prod Cums Rasters Other Scout View Intervals
Project Well Location FmTops Zones Logs IP Tests Fm Tests Cores Perfs Shows
ELEV_DF => 27 Active Only Read Only Save (*=Aliased) Default Sort Order
Tops
Repeats
Fm Name Src MD SS TVD QUAL Time(ms) Rpt Sym HoleAngle ChgDate Remark Description
A 6,671 -6,644 6,671 0 03/22/1997 Top of the A formation
B 6,743 -6,716 6,743 0 03/22/1997 Top of the B formation
C 6,764 -6,737 6,764 0 03/22/1997 Top of the C formation
D 6,857 -6,830 6,857 0 03/22/1997 Top of the D formation
Maintenance... New Top... Aliases... ReOrder... Src... Show Aliase
View As Imperial Metric Raw System Units=Imperial
Datum=NAD27
Version 3.3.0.4

The Active Only Check Box allows you to display only those Formation Tops that have live data in them. This is useful when you have a large number of top names for the project, but many of the tops have not yet been picked.

The FmTops tab displays a table showing all formation tops for the highlighted well. The table shows both measured depths (MD) and TVD subsea depths. Notice the datum elevation used to compute subsea values is displayed at the top of the table. The deviated wells are displayed with a column header of TVDSS. Non-deviated wells have a column header of SS. If the well is deviated, the subsea values are also TVD computed from directional survey data. You can modify either the MD or TVD value. The other value changes accordingly. You can also change the Active Datum and/or value from the FmTops Tab. You must click the **Save** button

to update the database.

Important Note: When typing values in the data cells, the value is recorded only when you move the cursor out of the edited cell or when the **Enter** key is pressed. The cursor moves out of a cell when an arrow key or the tab is pressed. To set a value to null, highlight the value, press the delete key or space bar, and then press the **Enter** key. Both MD and TVD values show a blank cell.

A top's remark field can be edited by typing in the Remarks cell or by using a Edit Remarks dialog box. The Edit Remark... dialog box is activated from a right button click popup menu Clicking on the Edit Remark... option brings up a ***Remarks*** dialog screen where you can add or modify the remarks for the top. Clicking on the Edit Properties... option brings up a ***Modify Zone Item Description*** dialog screen which allows you to change the Item Name, Source, Units (<>Metric), number of Decimals, Description and Remarks for the Item.

Note: Remember to click in a data cell for the top that you want to edit.

Formation tops are identified by a 1 to 30 character Item Name and a 1 to 8 character Source identifier sometimes referred to as a Source Code. The Source identifier is optional. A geologist might use their initials as the Source to identify their own picks for a particular top.

Each individual top value can have a 1 to 8 character quality code to indicate the quality of the formation pick. In addition, each top value can contain a 1 to 4096 character remark field.

The FmTops tab screen contains several buttons along the bottom for Maintenance, Printing the tops for the selected well, adding a new top, setting up aliases, setting a display order for the tops, and showing tops by a specific source.

Printing tops

The **Print Tops** button provides the ability to print the tops for the currently selected well. Click the printer icon to display the printer dialog menu to choose the printer and print the tops. Click **OK** to print to the selected printer.

New top

The **New Top**… button

allows you to quickly add a new top definition to the database.

Top aliases

The **Aliases** button

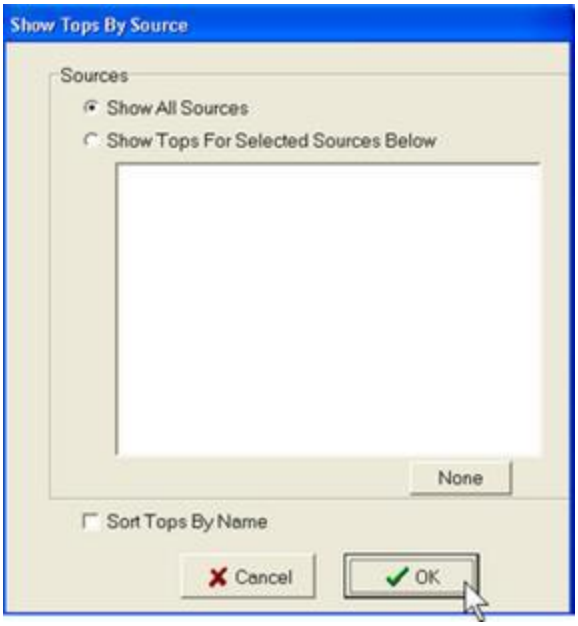
provides a mechanism to specify a prioritized list of top names as formation top equivalencies. During mapping, for example, if an alias name is specified, the database uses the alias list to search the database for the first top value that does not contain a null value. To set up an alias, first click in one of the data cells of the top to be aliased. Then, click the **Aliases** button.

Note: When defining aliases, don't forget to select the aliased top as the first top in the alias list.

Show tops by sourceShow Tops By Source – Fm Tops Tab – Main Module

The **Show Tops By Source** button

displays a dialog screen called, ***Show Tops By Source*** and is used to show the tops with all sources or by a selected set of tops. There is an option to sort the tops by name.



For this project there are not any source codes for tops. Click the **OK** button with the green check or the Cancel button with the Red X to close this dialog screen.

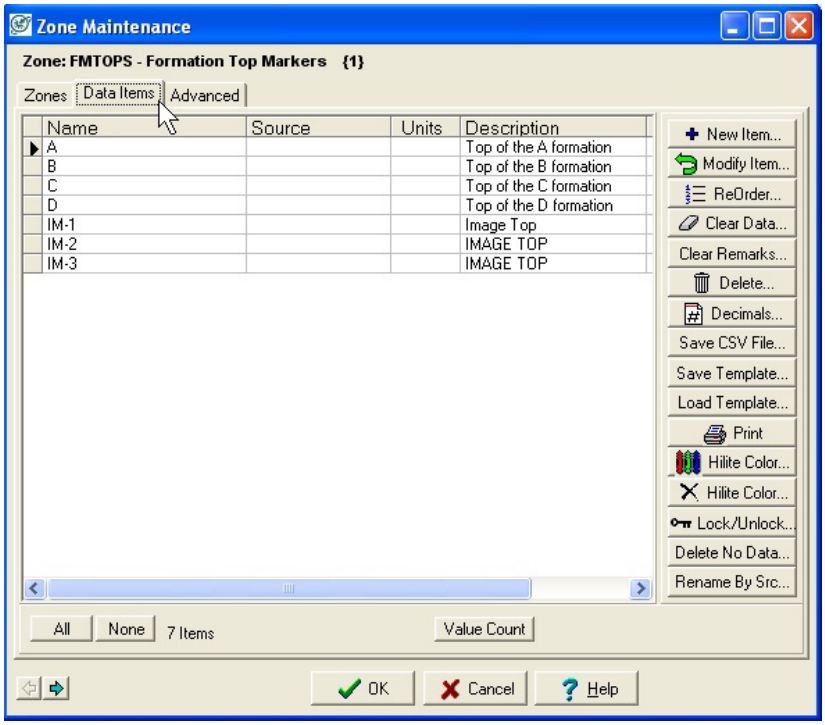
Reordering tops

The **ReOrder** button allows the geologist to specify the display order for viewing tops in a particular order or stratigraphic sequence. There is an option to display only those tops specified in the Order List. When this option is turned on, the other tops are not being displayed. This feature can save you time trying to find a particular top name in a long list of tops. There are two sort buttons available at the bottom of the ***Reorder*** dialog screen. An A to Z button and a Z to A button. On the **Import/Export** tab, there are two options to save a file or read a file, or to specify the sort order. The PETRA Order List is a binary file. The External File (Strat Table) is an ASCII file that can be edited by any editor that can open an ASCII file, such as Notepad, Excel, Word, and so forth. When using Word or Excel, remember to save the file as a text file instead of a Word Document or an Excel Spread Sheet.

Formation tops – maintenance

The **Maintenance** button invokes the maintenance dialog screen. This dialog screen provides maintenance of both tops and zone data. To perform maintenance on tops,

1. Click the **FM Tops** tab, and then click the Maintenance button.



2. After clicking the **Maintenance** button

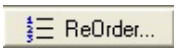
, click the **Data Items** tab.

   There are several options available to assist in the maintenance of the Tops.

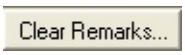
Options for maintenance

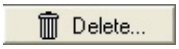
- The New Item…

button brings up a dialog box for adding a new Data Item to FMTOPS.
- The Modify Item…

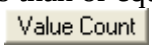
button is used to modify any of the Data Items Data Fields.
- The ReOrder… 

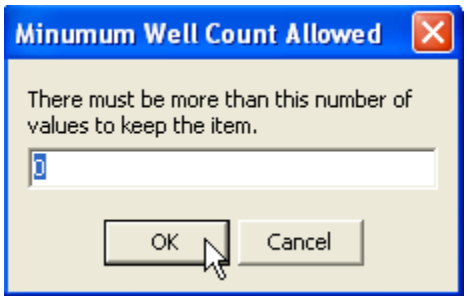
button is used to order the Data Items in the order desired by the user.
- The Clear Data…

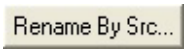
button is used to clear all of the Data Fields for the selected Data Item.
- The Clear Remarks… 

button is used to clear the Remarks field for the selected Data Item.
- The Delete… 

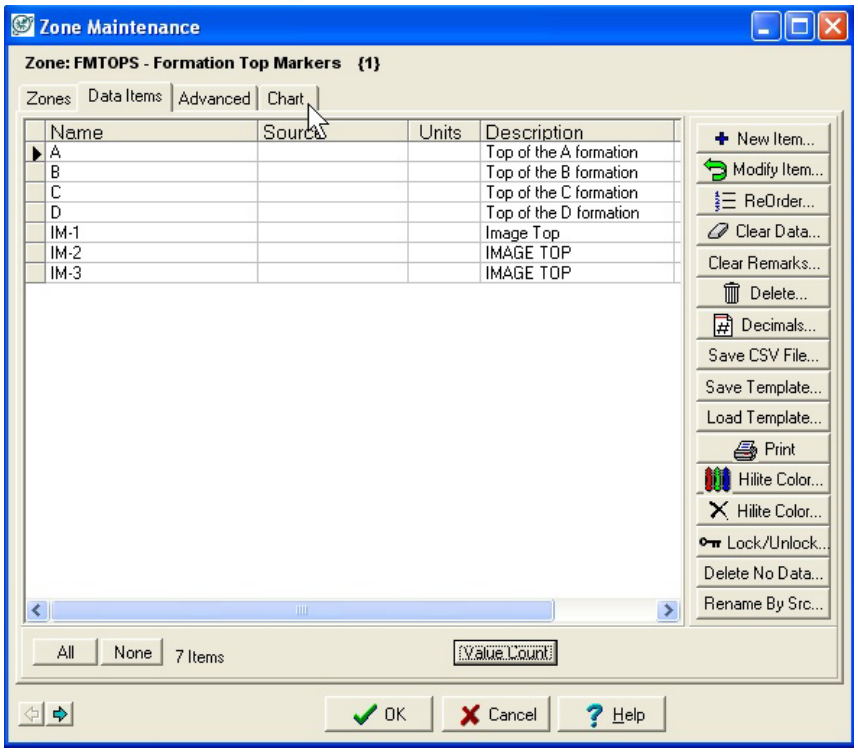
button is used to delete the selected Data Item.

- The # Decimals… button is used to set the number of decimals to be displayed for the selected Data Item(s).
- The Save CSV File button creates an. csv file with the Project name and description along with the top names and description.
- The Save Template... button saves a template definition file.
- The Load Template... button loads a saved template definition file. It adds zone item names to the current zone.
- The Print button prints the Project name and description along with the top names and description.
- The Hilite Color... button with the crayons is used to select a color for high lighting the selection.
- The Hilite Color... button with the large X is used to remove the hilite color for the selected.
- The Lock/Unlock… button is used to lock or unlock the selected items for the selected wells only.
- The Delete No Data… button is used to delete well with less than or equal the number of tops that is selected. You must click the **Value Count** button  first to active the counting of the tops.



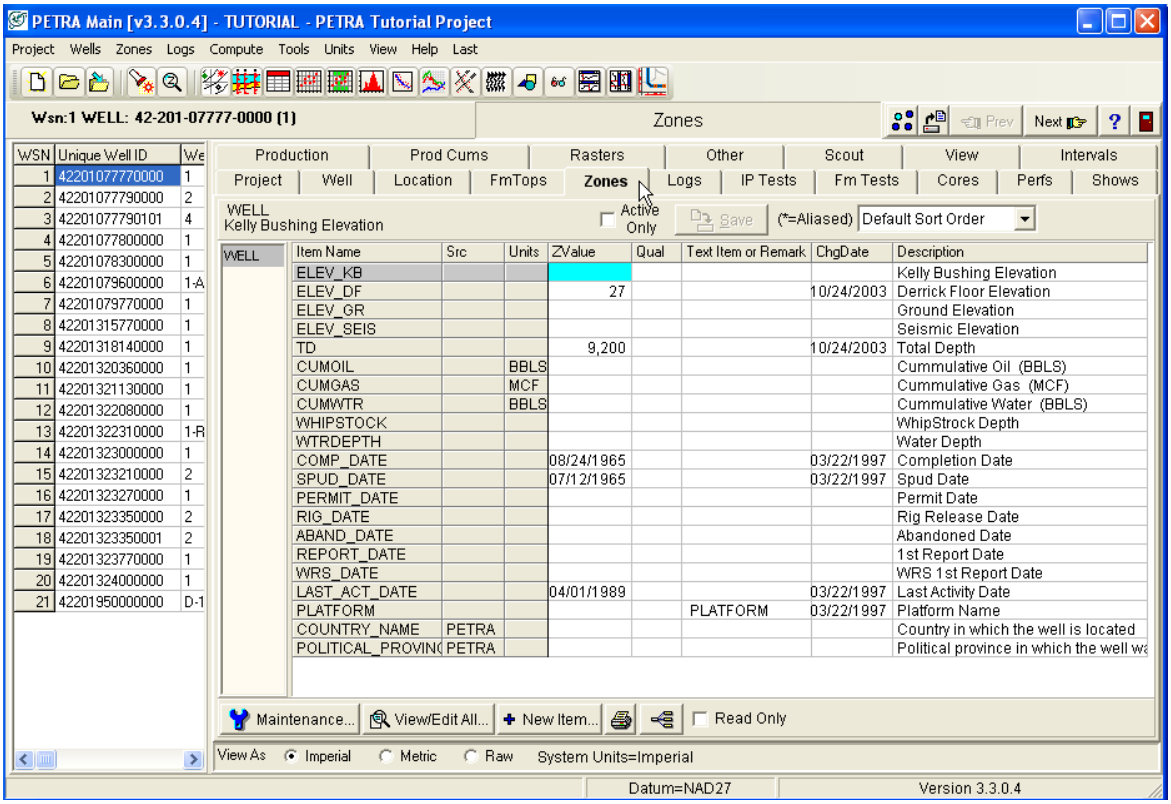
- The Rename by Src…  button is used to rename all of the tops with the old source to the new source.

- The ALL All button is used to select all of the Data Items.
- The None None button is used to de-select any/all selected Data Items.
- The Value Count Value Count button is used to display the number of wells that contain live data for each of the Data Items. Shown in parentheses to the left of the Formation Top Name in the dialog screen above.



Zones Tab

To work with zones, from the Main screen, click the **Zones** tab.



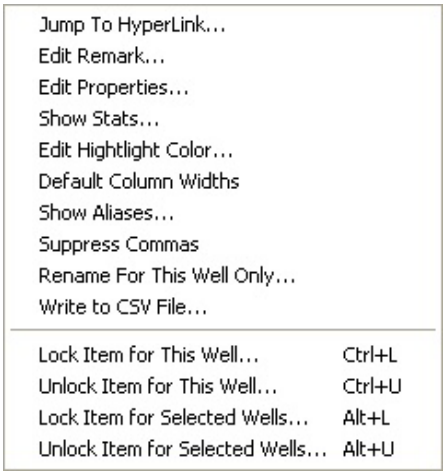
PETRA provides for an unlimited number of user-defined data fields to be stored in the project database. User-defined well data are organized into groups called zones. A zone is like a table containing one or more columns of numbers, dates, or text. Rows in the table correspond to wells.

Zones have a corollary with geologic zones because they are defined by a depth interval. Zones can reference measured depths, subsea TVD, but more frequently reference formation tops or markers. When a zone references an upper and lower formation marker, PETRA quickly evaluates the tops to determine the appropriate depth range for any given well.

The Zone database provides a logical and efficient organizational tool for managing geological mappable well data. Items such as isopach, true stratigraphic thickness, net pay, average porosity, and so forth, can be grouped together under the zone corresponding to the geologic depth interval of interest.

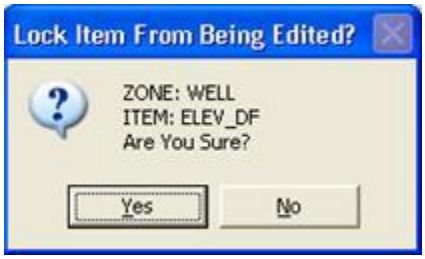
The Zones tab section of the main screen provides a quick visual reference for system and user defined zone data fields. Zone data are presented as a table with a list of zone names on the left and data values on the right. Clicking the zone name results in the zone data items being displayed for the selected zone. Zone data values can be edited and updated to the database by clicking the **Save** button.

A zone item's remark field can be edited by typing in the remark cell or by using an ***Edit Remarks*** dialog box. The ***Edit Remarks... and Edit Properties...*** dialog boxes are activated from a right button click popup menu:

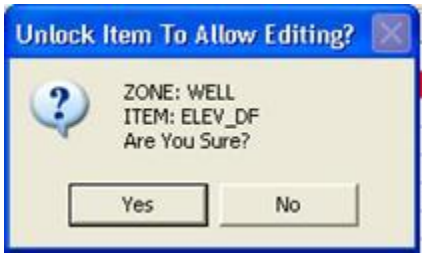


- The Jump To Hyperlink... option is used to associate a file or WEB Link that you want to see displayed for the well when you activate this option. For instance, enter the path to an excel spreadsheet in the Text Item or Remark data field. When you click the **Jump To Hyperlink...** option, the specified spreadsheet is displayed.
- Click the **Edit Remark...** option to bring up a Remark screen where you can add or modify the remarks for the zone.
- Click the **Edit Properties...** option to bring up a screen which allows you to change the item name or description.
- Click the **Show Stats…** option to display a chart with the data statistics for the data item for the selected wells.
- Click the **Edit Highlight Color…** option to display a Set Highlight Color dialog screen.
- Click the **Default Column Widths**… option to set the column widths back to the default widths — very useful if you have sized the columns so that you can no longer see the columns.
- Click the **Show Aliases…** option to display a dialog screen that shows what the zone item is aliased to.
- Click the **Suppress Commas**… option to display the values without a comma.
- Click the **Rename For This Well Only…** option to rename the selected item to a new name for this well only.

- Click the **Write to CSV File…** option to write the FmTops that are displayed for the current selected well to a CSV file.
- Click the **Lock Item for This Well...** option or click the Hot keys **Ctrl+L** to bring up a confirmation dialog allowing the item to be locked.



- Click the **Yes** button to lock the specified item. Click the **No** button to cancel the request.
- Click the **Unlock Item for This Well...** option or click the Hot keys **Ctrl+U** to bring up a confirmation dialog screen allowing the item to be unlocked.



- Click the **Yes** button to unlock the specified item. Click the **No** button to cancel the request.
- Click the **Lock Item for Selected Wells...** option or click the Hot keys **Alt+L** to lock the item for all selected wells.

- Click the **OK** button to lock the specified item for the selected wells. Click the **Cancel** button to cancel the request.
- Click the **Unlock Item for Selected Wells...** option or click the Hot keys **Alt+U** to unlock the item for all selected wells.

- Click the **OK** button to unlock the specified item for the selected wells. Click the **Cancel** button to cancel the request.
- A zone Maintenance utility can be accessed for adding, deleting, and modifying zone definitions and zone data variables.
- The View/Edit All… button

invokes a screen that provides viewing and editing of zone data items presented by zone instead of by well. A table shows the zone data for all selected wells. A statistical histogram is available showing the data range and frequency distribution for zone data. The view/edit utility can be accessed from various PETRA screens and provides a quick data check or verification of computed results.
- Use the Print Zone Data icon button to print your Zone data for the current selected well.
- Use the Define Zone Aliases button to display the Assign Zone Item Aliases dialog screen. You can assign aliases for the items in a Zone. Click the **Done**

button when finished.

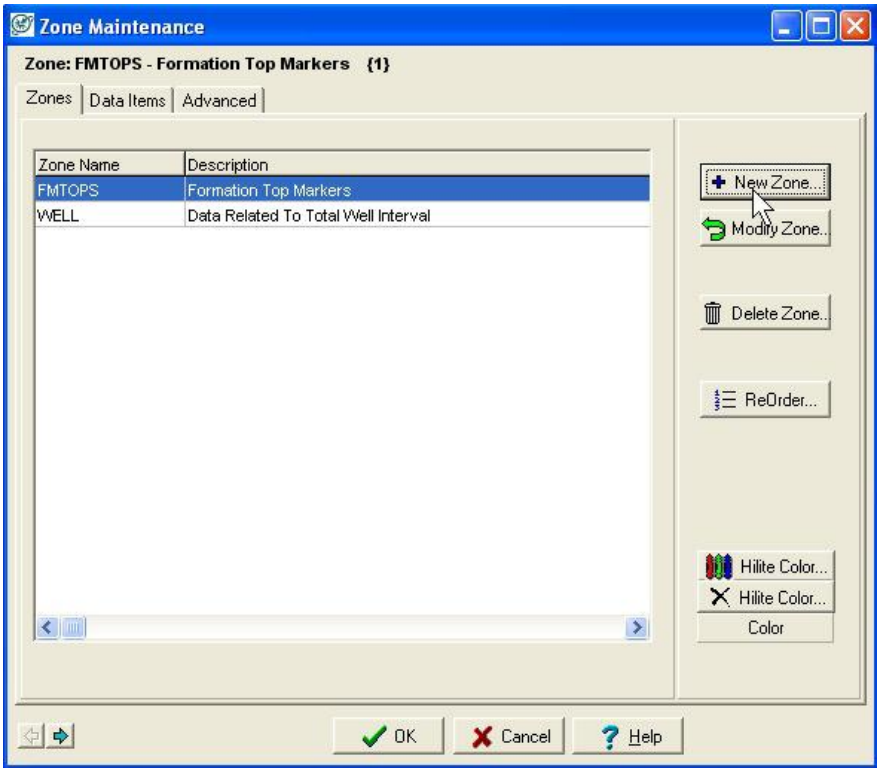
Creating a new zone

A zone is a logical grouping of related data. Zones usually represent a geologic interval and reference formation tops to define the depth interval of interest. Zones contain z data items or variables for storing numbers, dates and text fields. When you add a new zone to a project, you only add the definition and depth reference. You are not adding any data values to the wells.

Suppose we have two formation tops, A and B, which define the upper and lower boundaries of our zone of interest. We can create a zone called AB to store reservoir properties such as isopach, net pay, porosity feet, etcetera.

First, click the **Maintenance** button

on the Zones Tab. The Zone Maintenance screen is displayed.



- The **New Zone…** button brings up a dialog box for adding a new Zone.

- The **Modify Zone…** button brings up a dialog box for modifying the Zone name, Description, and/or remarks.

- The **Delete Zone…** button deletes any non-system defined Zone that is selected to be deleted.

- The **ReOrder** button allows the geologist to specify the display order for viewing tops in a particular order or stratigraphic sequence.

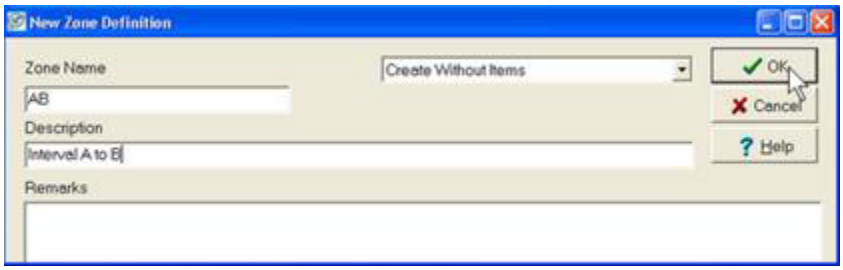
- The **Hilite Color...** button with the crayons is used to select a color for high lighting the selected.

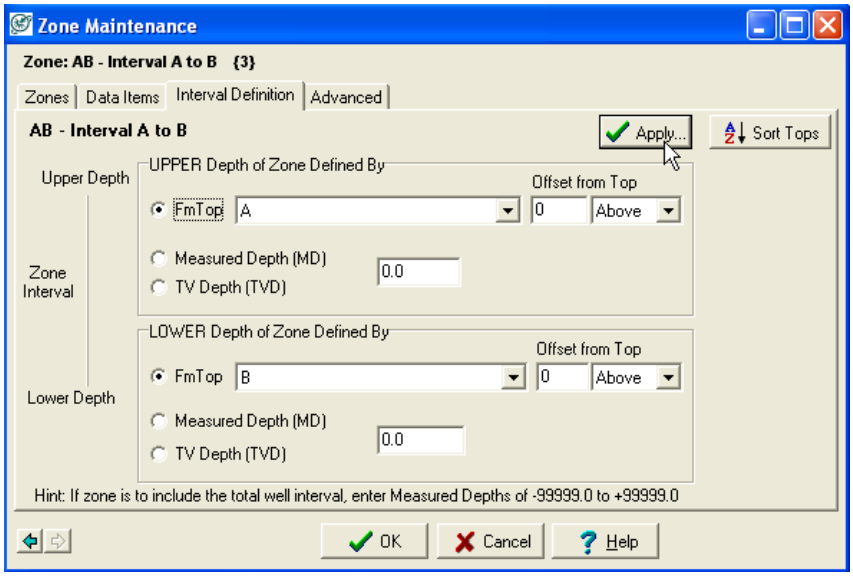
- The **Hilite Color...** button with the large X is used to remove the hilite color for the selected.

1. Click the New Zone button.
2. On the new zone definition screen, enter AB as the zone name.

3. Enter a description such as, Interval A to B.
4. Click the **OK** button to add the zone definition to the database.

   The zone AB is added to the database.
5. Next, you need to define the depth interval for the AB zone. The Interval Definition Tab is activated. The upper and lower depth references can now be set. The following dialog screens is displayed:

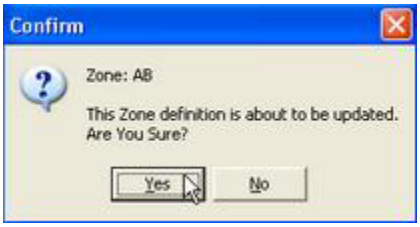




6. Set the upper depth to FmTop A by selecting top A from the drop down list in the Upper Depth group.
7. Click the radio button labeled **FmTop** to set it to the on position (Radio button filled in), if it is not already set.
8. Set the lower depth to the FmTop B in a similar manner. Again, make sure the radio button labeled FmTop is set to the on position (Radio button filled in). Notice too, that you can enter offset footages for the UPPER and LOWER depths. This allows the zone to start, for example, 25 feet (or meters) above or below the specified formation top.

9. Click **OK**.

   An Update Zone Interval definition confirmation screen is displayed with the Zone name, the Upper Depth FmTop, Lower Depth FmTop, and offsets for each if entered.



10. Click **OK** to return to the Zones Tab screen.

    You receive a prompt upon exiting for each zone that has been modified.

11. Click **Yes** to accept the changes.

    The AB zone is added to the Zones Tab.

12. Click the AB zone name.

    Notice that there are no data fields associated with the new zone.

In the next section we add data fields to the new zone.

Adding new zone variables or items

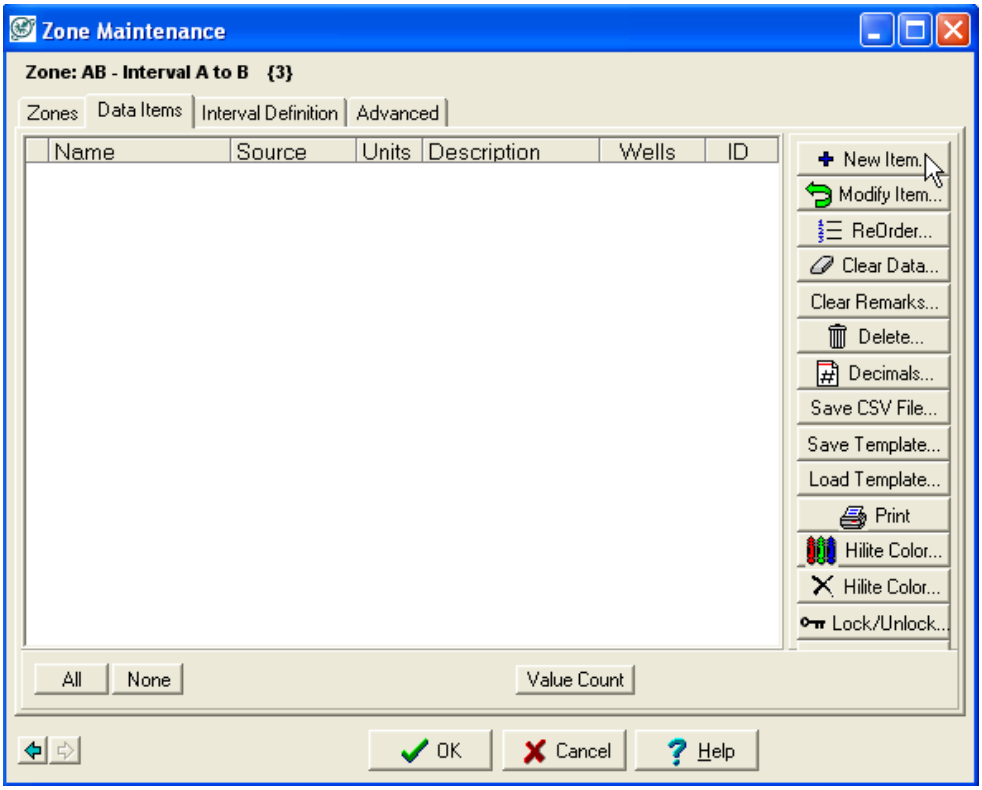
Zone data items are added to a zone using the zone Maintenance button

located at the bottom of the Zones Tab screen or by using the Add a new Zone… button.

For this exercise, use the zone Maintenance button

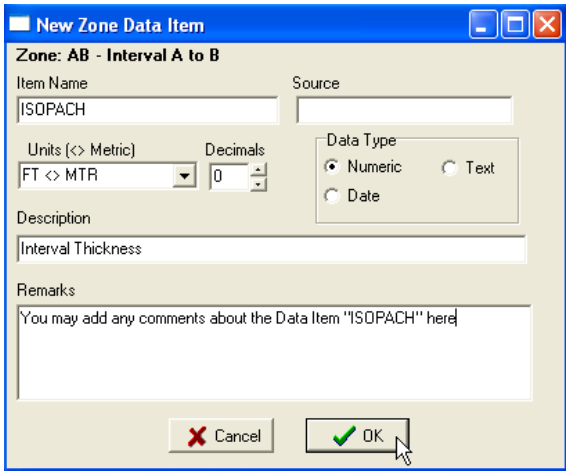
to add the Data Items to the Zone.

1. From the Zone Maintenance Screen, click to highlight the AB zone name, and then click the **Data Items** tab.



If any data items have been added, they are displayed at this time.

2. To create three zone data items, click the **New Item** button to start adding fields using the New Zone Data Item screen.



3. Enter the name and description for the data item. For now, enter the name **ISOPACH** and description **Interval Thickness**. You can specify the units as FT <>MTR. The toggle will be Feet to Meters if your project is set to Imperial Units. Make sure the Data Type is numeric.

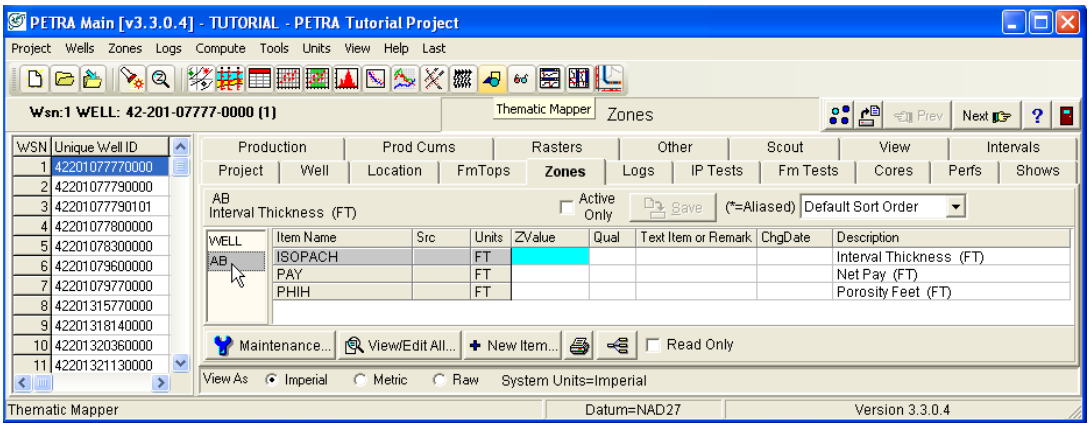
4. Click the **OK** button with the green check to add the isopach definition to the AB zone.

   The New Zone Data Item screen reappears to allow you to continue entering items.

5. Add a field called **PAY** with a description of Net Pay and PHIH with a description of Porosity Feet.

6. Click the **Cancel** button with the red X to stop adding more data fields.

7. Return to the Zones Tab screen from the maintenance screen by clicking the **OK** button with the green check .



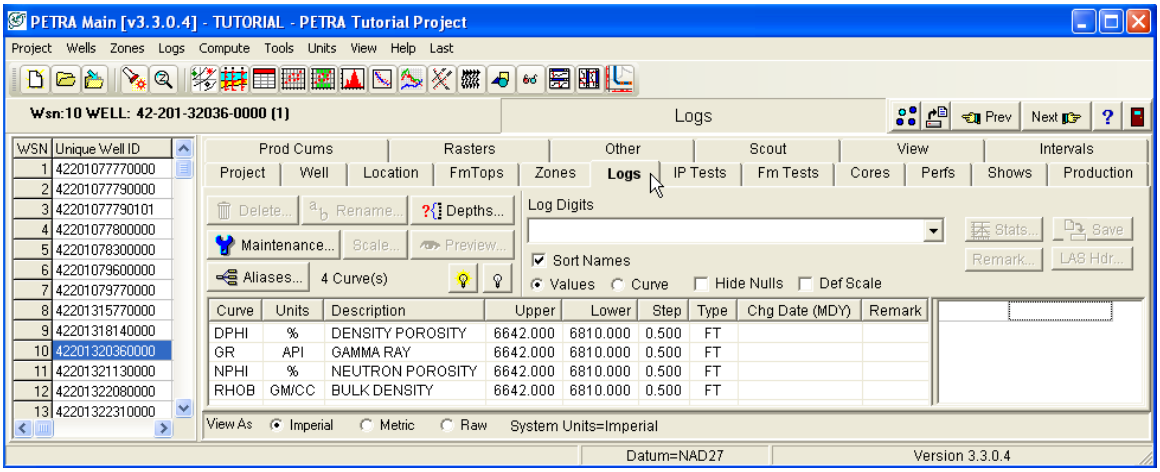
8. Click the **AB** zone on the Zones Tab list to show the newly added data fields.

   All values are set to null, which is indicated by blank data cells.

   New zone variables are also added to zones during calculations. For example, instead of adding the ISOPACH data item definition ahead of time, you can simply compute the AB zone isopach using the Compute → From Zones → Isopach menu option. You can actually create an isopach variable for all project zones at once, if necessary.

Logs Tab

From the Main screen, click the **Logs** tab, and then click the well list to select the well with **WSN=10**.


PETRA Main [v3.3.0.4] - TUTORIAL - PETRA Tutorial Project
Project Wells Zones Logs Compute Tools Units View Help Last
Wsn:10 WELL: 42-201-32036-0000 (1)
Logs
Prev
Next
WSN Unique Well ID
1 42201077770000
2 42201077790000
3 42201077790101
4 42201077800000
5 42201078300000
6 42201079600000
7 42201079770000
8 42201315770000
9 42201318140000
10 42201320360000
11 42201321130000
12 42201322080000
13 42201322310000
Prod Cums Rasters Other Scout View Intervals
Project Well Location FmTops Zones Logs IP Tests Fm Tests Cores Perfs Shows Production
Delete... Rename... Depths...
Maintenance... Scale... Preview...
Aliases... 4 Curve(s)
Log Digits
Stats... Save
Remark... LAS Hdr...
Sort Names
Values Curve Hide Nulls Def Scale
Curve Units Description Upper Lower Step Type Chg Date (MDY) Remark
DPHI % DENSITY POROSITY 6642.000 6810.000 0.500 FT
GR API GAMMA RAY 6642.000 6810.000 0.500 FT
NPHI % NEUTRON POROSITY 6642.000 6810.000 0.500 FT
RHOB GM/CC BULK DENSITY 6642.000 6810.000 0.500 FT
View As Imperial Metric Raw System Units=Imperial
Datum=NAD27
Version 3.3.0.4

PETRA provides a log curve database for storing digital well logs. Logs can be imported in standard LAS and LIS data formats. PETRA includes a robust set of tools for editing, analyzing, and extracting reservoir properties, such as net pay and hydrocarbon pore volume from log data.

The Logs tab section lists the digital well logs stored for a particular well. In addition, if you click the Radio button to the left of **Values** and double-click a curve, DPHI for instance, the log data values for the selected log are displayed. The log values can be edited from this list, if desired. If you click the Radio button to the left of the **Curve** option, the log curve is displayed.

The **Delete**

button deletes the highlighted logs from the selected well.

The **Rename**

button allows a selected log to be renamed to one of the already defined log names. Renaming a log for a well simply changes the log name reference.

The **Log Maintenance**

button is used to add new log names and descriptions, make global changes to the log database, and rename or delete log curves by name.

The **Depths**

button allows you to restrict the depth interval of the data shown in the Log Preview and Digits displays.

The **Log Preview**

option displays selected well logs side-by-side and is intended as a quick quality control tool. The log preview utility also offers several log editing tools and can display and correlate formation tops.

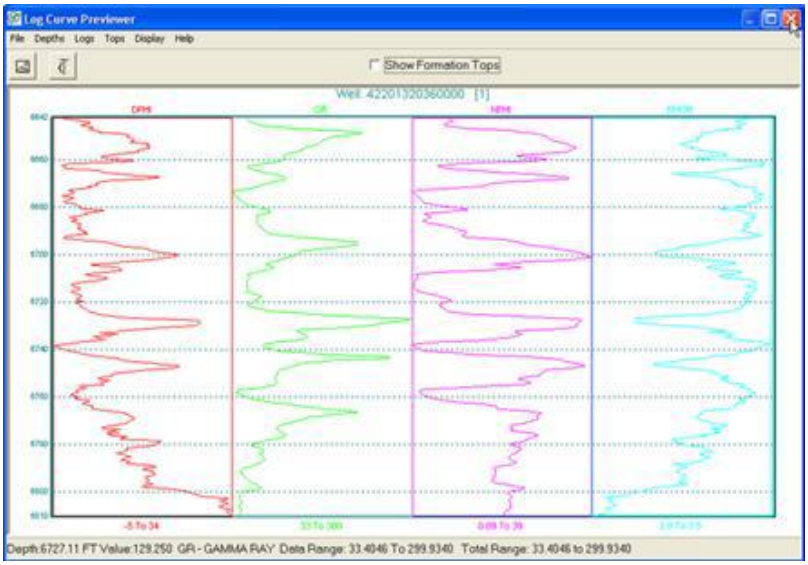
1. Select one or more log curves from the **Logs** tab screen and click the **Log Preview**

button to view the logs.

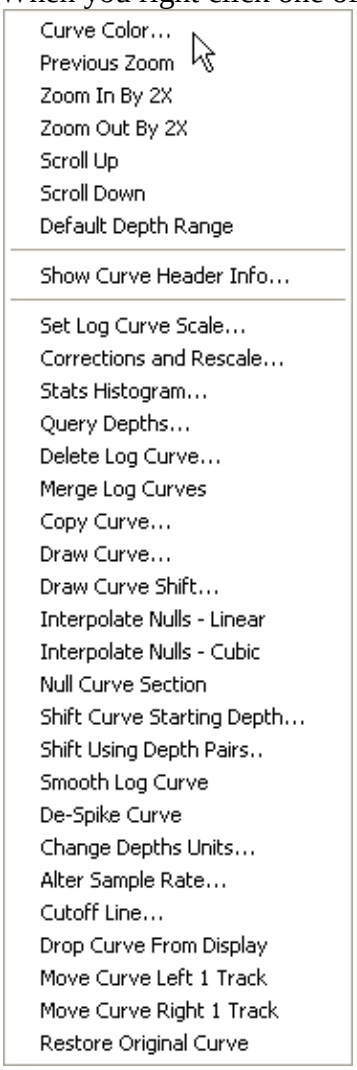
   Notice that as you move the mouse over a log curve at the Status bar at the bottom of the screen, the curve summary information is displayed. If you click the right mouse button

over a specific curve, you see a large pop-up menu containing several functions for editing curves.

2. Exit the Log Preview screen clicking the **File → Close** menu or by clicking the standard **Windows Close** button in the upper right corner of the screen


Log Curve Previewer
File Depths Logs Tops Display Help
Show Formation Tops
Depth:6727.11 FT Value:129.250 GR - GAMMA RAY Data Range: 33.4046 To 299.9340 Total Range: 33.4046 to 299.9340

When you right click one of the curves, a Pop Up Menu, as shown below, is displayed.



To discover more about these options,

1. Click the **Logs** Tab on the Main Screen.
2. Click the **Log Preview** tab, and then the **Help** menu.

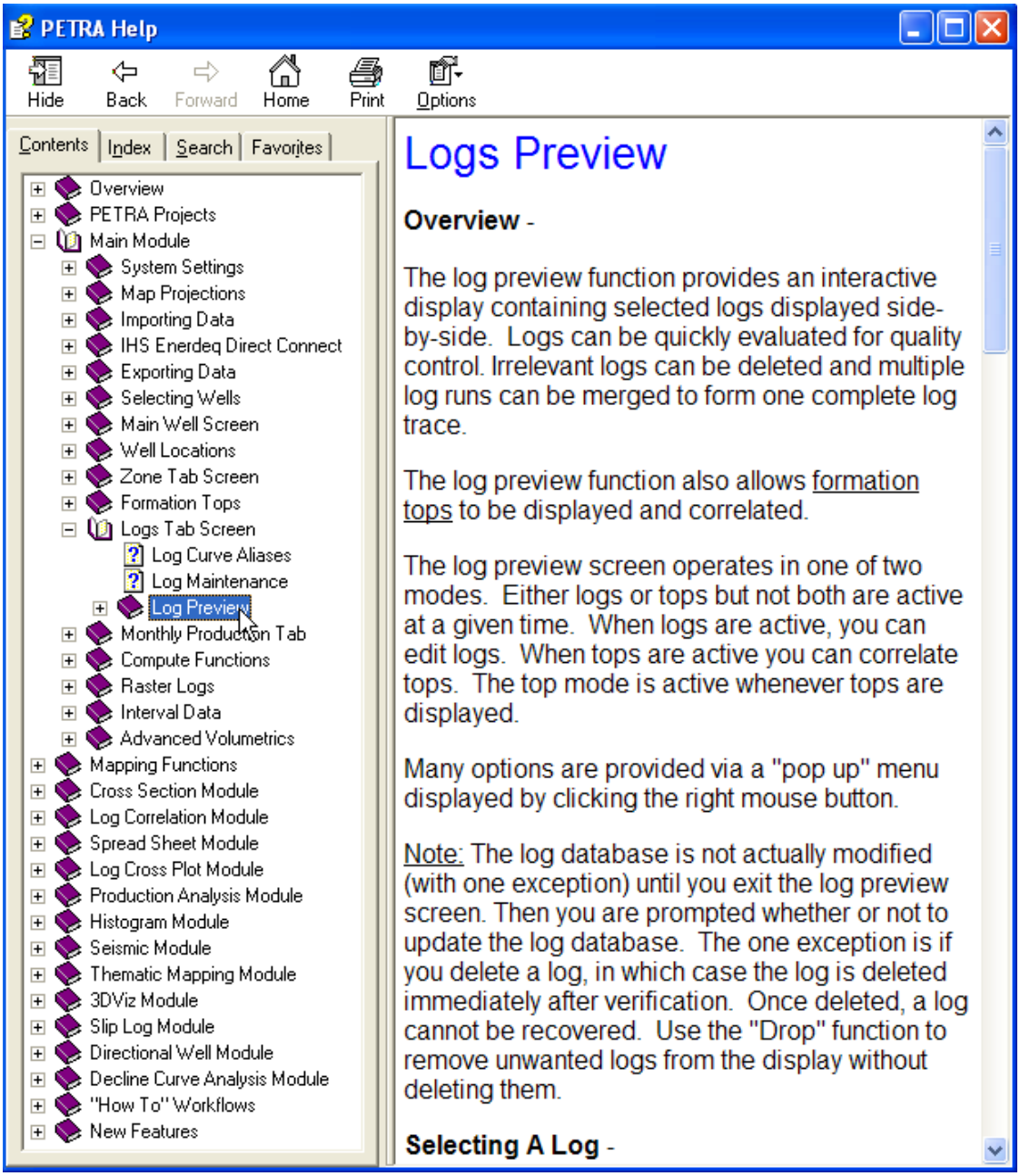
Another method to display Help information for Log Preview is to click the Help>Help… Menu Item in the Main module.

1. Click the plus sign to the left of the Main Module.

   A list of the Help Topics under the Main Module is displayed.

2. Click the plus sign to the left of the Logs Tab Screen.

3. Click the Log Preview entry.

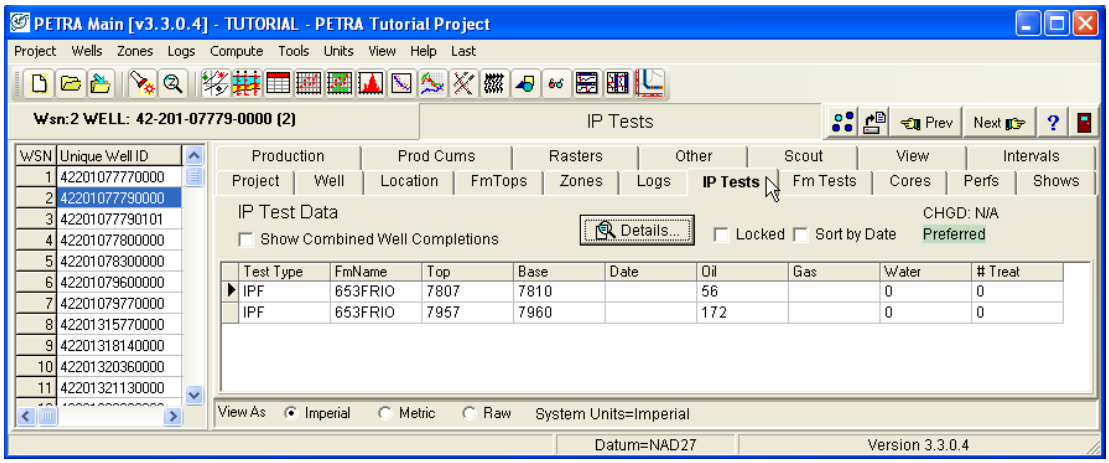

PETRA Help
Hide
Back
Forward
Home
Print
Options
Contents
Index
Search
Favorites
Overview
PETRA Projects
Main Module
System Settings
Map Projections
Importing Data
IHS Enerdeq Direct Connect
Exporting Data
Selecting Wells
Main Well Screen
Well Locations
Zone Tab Screen
Formation Tops
Logs Tab Screen
Log Curve Aliases
Log Maintenance
Log Preview
Monthly Production Tab
Compute Functions
Raster Logs
Interval Data
Advanced Volumetrics
Mapping Functions
Cross Section Module
Log Correlation Module
Spread Sheet Module
Log Cross Plot Module
Production Analysis Module
Histogram Module
Seismic Module
Thematic Mapping Module
3DViz Module
Slip Log Module
Directional Well Module
Decline Curve Analysis Module
"How To" Workflows
New Features
Logs Preview
Overview -
The log preview function provides an interactive display containing selected logs displayed side-by-side. Logs can be quickly evaluated for quality control. Irrelevant logs can be deleted and multiple log runs can be merged to form one complete log trace.
The log preview function also allows formation tops to be displayed and correlated.
The log preview screen operates in one of two modes. Either logs or tops but not both are active at a given time. When logs are active, you can edit logs. When tops are active you can correlate tops. The top mode is active whenever tops are displayed.
Many options are provided via a "pop up" menu displayed by clicking the right mouse button.
Note: The log database is not actually modified (with one exception) until you exit the log preview screen. Then you are prompted whether or not to update the log database. The one exception is if you delete a log, in which case the log is deleted immediately after verification. Once deleted, a log cannot be recovered. Use the "Drop" function to remove unwanted logs from the display without deleting them.
Selecting A Log -

IP Tests Tab

From the Main screen

1. Click the **IP Tests** tab.

   Shown below are the IP tests for WSN 2.

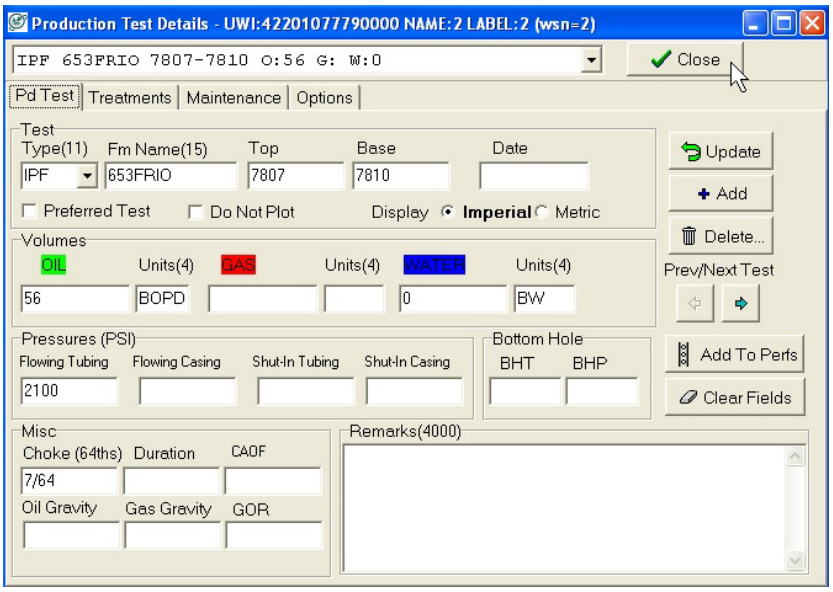


   The **Show Combined Well Completions** check box shows the completions from the other completions for the well, if there are any.

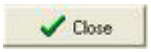
   The Locked check box locks the data so that it cannot be modified unless you Unlock the data.

2. Click the **Details...** button

   The Production Test Details screen is displayed.



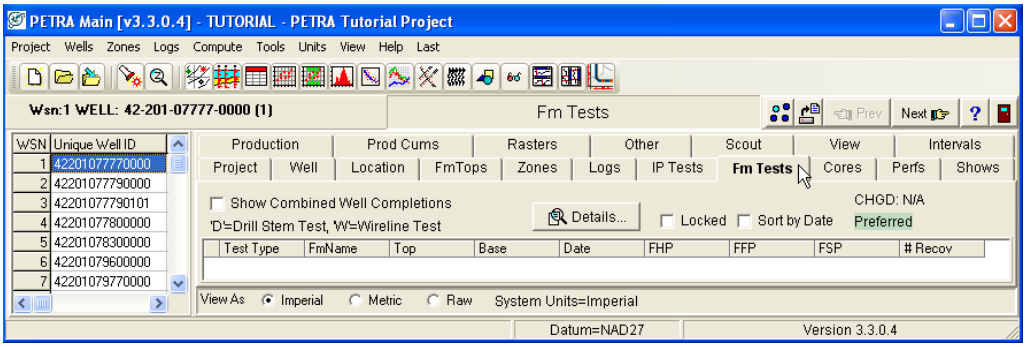
You can add, delete, update, scroll through tests, add IP Test depths to perfs and clear the data fields on this screen.

3. Click the **Close**  button with the green check to close the ***Production Test Details*** dialog screen.

Fm Tests Tab

From the Main screen,

1. Click the **Fm Tests** tab. There is no Fm Test data for this set of wells.

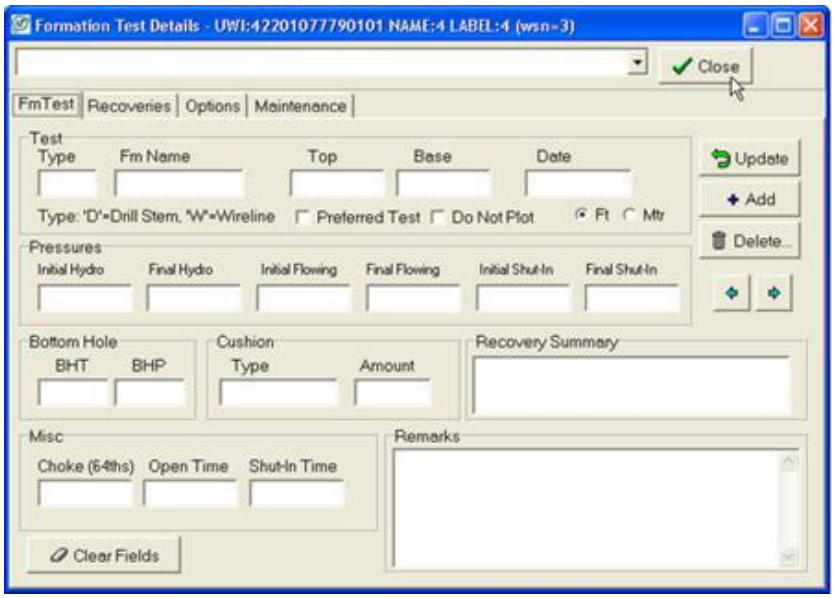


The Show Combined Well Completions check box shows the completions from the other completions for the well if there are any.

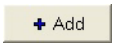
The **Locked** check box locks the data so that it cannot be modified unless you Unlock the data.

2. Click the **Details...** button.

   The ***Formation Test Details*** dialog screen is displayed.



   You can click the **Update**

button, the **Add** 

button, the **Delete**

button, scroll through tests (**Previous Test/Nest Test**
buttons) on this screen. When you click the **Recoveries** tab, you have the same options available as well. Click the **Clear Fields**

button to clear the data fields. Click the **Options** tab to uncheck the Display Choke Size in 64th inches.

3. Click the **Maintenance** tab to use the various maintenance options: Delete All Tests For This Well..., Delete All Test For ALL WELLS IN DB..., and to Set All FmTests UNITS FLAGS to Current Project Units.

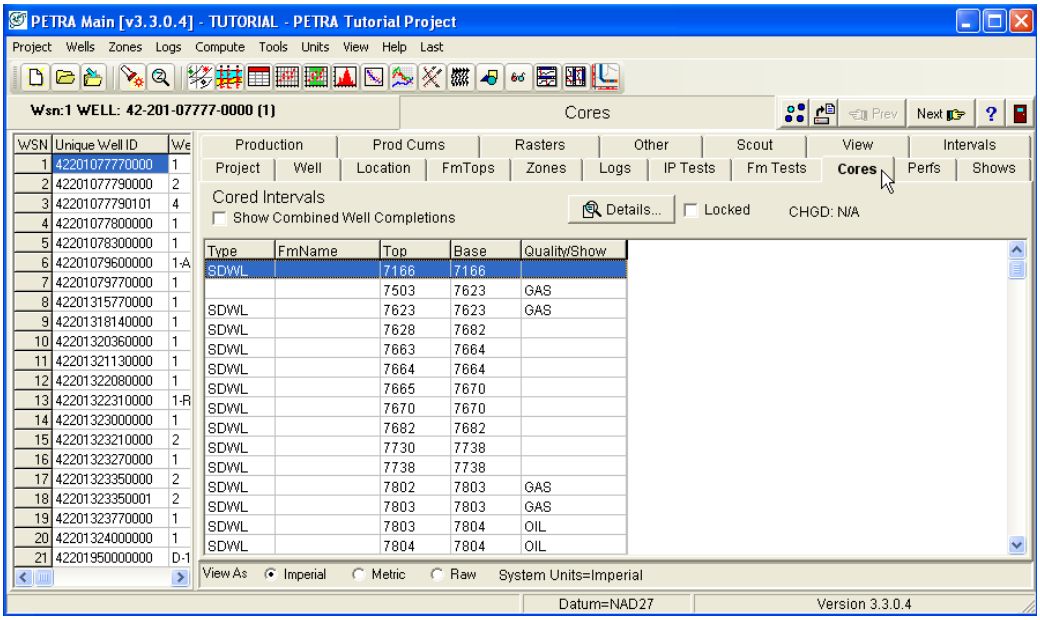
4. Click the **Close**

button with the green check to close the ***Production Test Details*** dialog screen.

Cores Tab

From the Main screen,

1. Click the **Cores** tab.
2. Click the first well in the project.

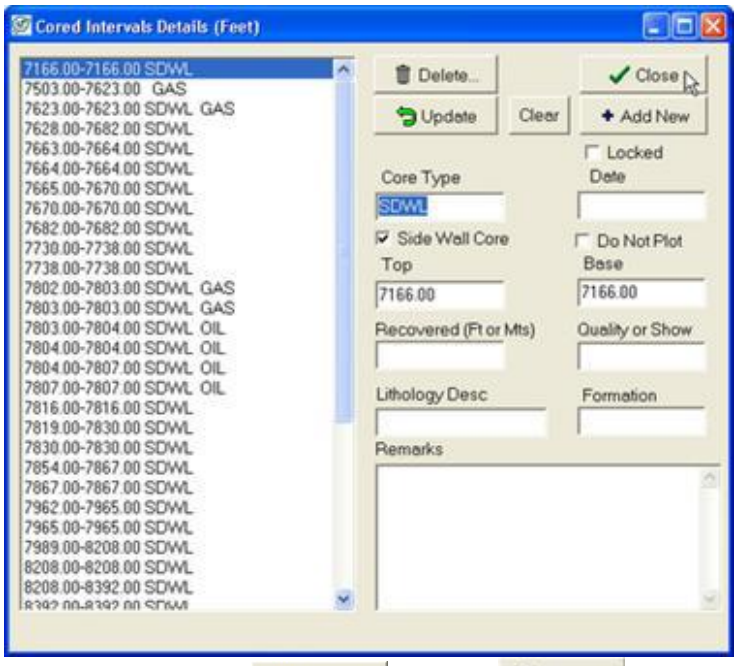


You see the data that has been loaded for this well.

If there are any well completions, the Show Combined Well Completions check box is marked and a list of the wells follows.

3. Click the **Details** button .

The Locked check box locks the data so that it cannot be modified unless you Unlock the data by clicking the **Locked** check box to remove the check.



You can Add New , Delete , Update , and Clear Cored data using the buttons for these options on this screen.

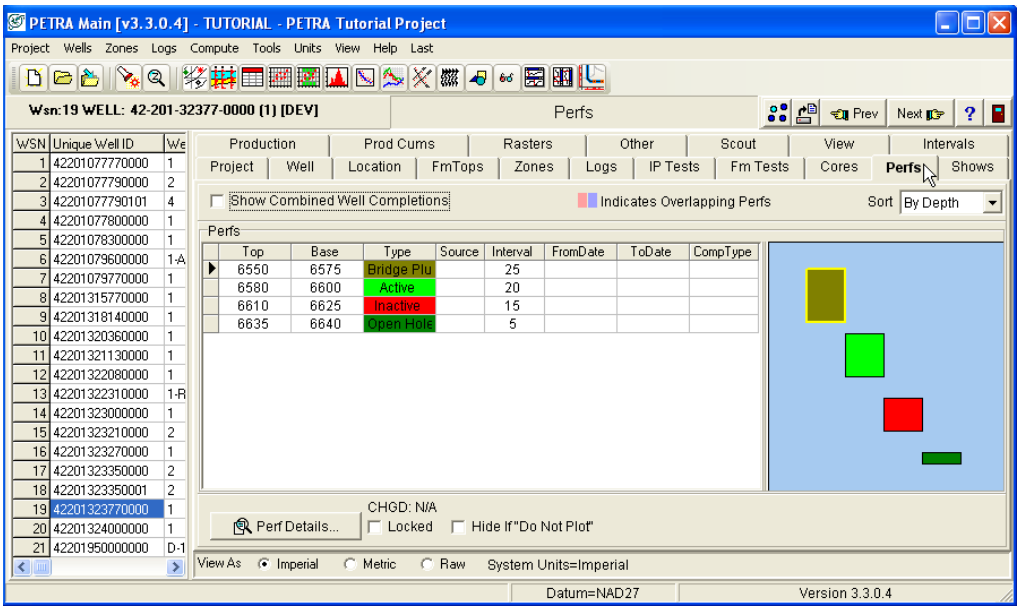
4. Click the **Close** button with the green check to close the ***Cored Intervals Details*** dialog screen.

Perfs Tab

From the Main screen,

1. Click the **Perf** tab.
2. Click **WSN 19** in the project.

   You see the data that has been loaded in this well for the Perfs. The Locked check box locks the data so that it cannot be modified unless you Unlock the data by clicking the Locked check box to remove the check.



3. Click the **Perfs Details...** button .

   You can Add New , Update , Delete Current Perf , and Clear Fields . There is a button at the bottom for deleting all of the perf data for this well . You can also lock the perfs for this well by clicking the check box to the left of **Locked** at the bottom of the screen. If the depths are not sorted properly, you can sort them by clicking on the **Sort** button at the bottom of the screen.

   There are different Perf Types that can be set by clicking the drop-down selection button to the right of the Perf Type data field.

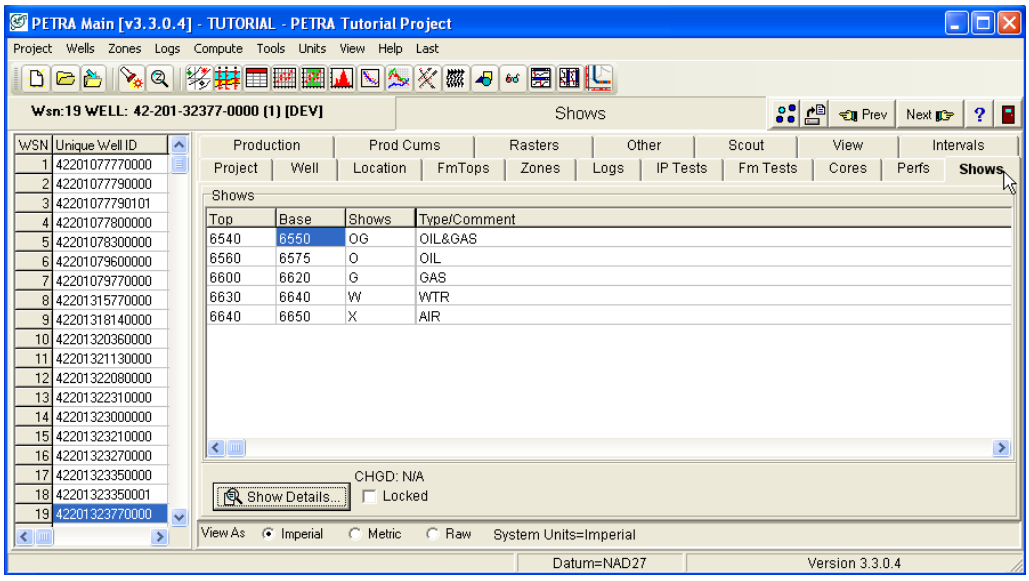
4. Click the **Cancel** button with the red X to close the ***Perfed Intervals*** dialog screen without saving any changes.

Shows Tab

From the Main screen,

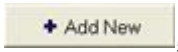
1. Click the Shows tab.
2. Click **WSN 19** in the project.

   You see the data that has been loaded in this well for the Shows. The Locked check box locks the data so that it cannot be modified unless you Unlock the data by clicking the Locked check box to remove the check.



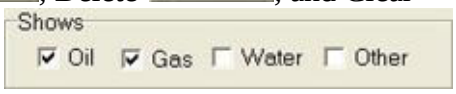
3. Click the **Show Details...**

button.

   You can Add New 

, Update

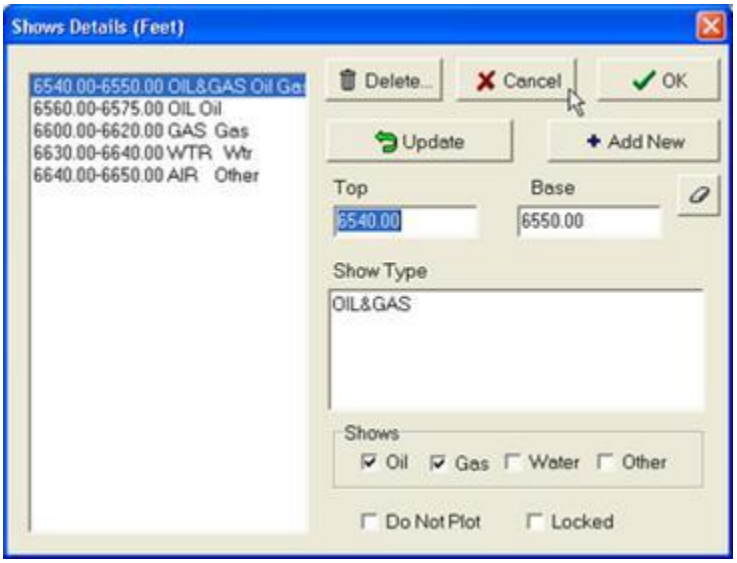
, Delete

, and Clear Fields
. There is an option for setting the Shows 

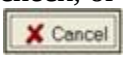
by clicking the check box to the left for the type of show or shows that are associated with the depth range that was entered for the show.

   You can mark a show as Do Not Plot by clicking the check box to the left of the **Do Not Plot** option at the bottom of the screen.

   You can lock the shows by clicking the check box to the left of the **Locked** option at the bottom of the screen.



4. Close and accept any changes made by clicking the **OK**

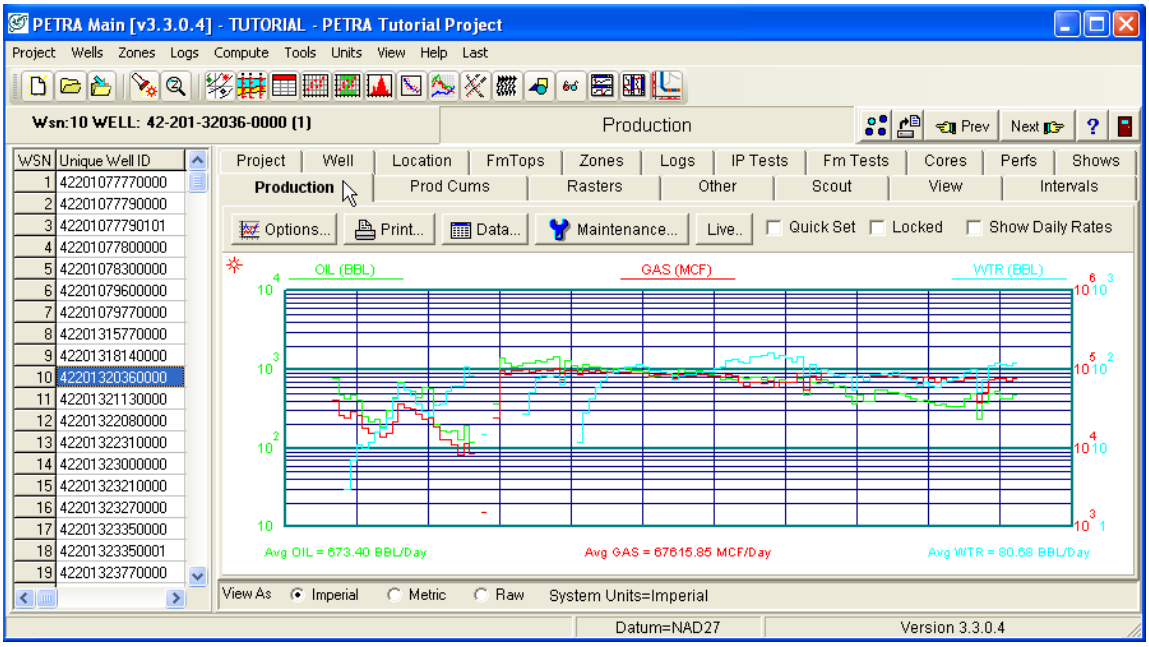
button with the green check, or close the dialog screen without saving the changes by clicking the **Cancel** 

button with the red X.

Production Tab

From the Main screen, click the **Production** tab, and then click the well list to select **WSN=10**. For this display the Mo Prod Chart BkGnd color has been changed from black to white. The Mo Prod Years color has been changed from white to black. Some of the Mo Prod Chart's colors were changed to make them brighter for the display.

The system colors can be modified by going to **Project → Settings...→ System Colors....** Be careful when making changes to the System Colors. Remember the original setting so that you can change the setting back to the original if this causes problems.



PETRA includes a production database for storing production data (or any other data) on a monthly basis. Production can be imported from commercial sources such as IHS, loaded from ASCII tabular files, or entered manually into a custom spreadsheet that is saved as an .csv file and loaded into the Production table. The database is not limited to OIL, GAS, and WATER production. Like the zone database, you can define and store monthly data for an unlimited number of data items. Data items, such as, injected water or CO2 production can just as easily be stored, charted, and used in calculations. Functions are available to compute cumulative values and perform month-to-month data transformations using a user-defined mathematical equation evaluator.

The Production Tab screen shows a chart of selected monthly production data for the current well. Wells not containing the selected data are indicated by the words No Data in the chart. By default, Oil, Gas, and Water are displayed in the chart. The Options button

allows any monthly data to be charted. Scales can be set automatically or manually.

The **Data** button

displays the monthly production custom spreadsheet where data can be entered, modified, and printed.

The **Maintenance** button

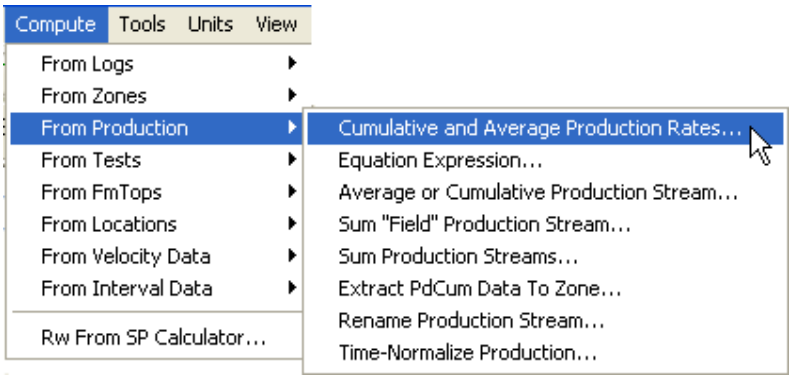
is used to add, modify, and delete production data item names.

Computing cumulative production data

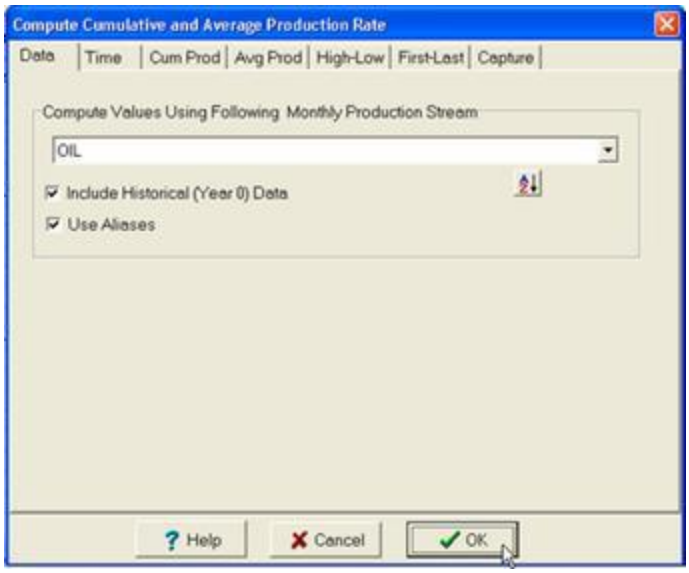
Monthly production data is stored as individual monthly values in the database. If you want to know and map the total production for the wells in our project, you need to compute a cumulative value. The cumulative values are stored in a zone data item, normally under the WELL zone. PETRA can compute cumulative values for any monthly production variable over a selected date range. In addition, you can compute the total number of years used to determine the cumulative values. The total year's value can aid in determining the significance of the production of one well relative to another well with a similar cumulative value.

The cumulative production calculations are performed for all wells currently selected in the main module, that is, those wells listed on the main screen.

1. Select the Main screen's **Compute → From Production → Cumulative and Average Production Rates…** menu.



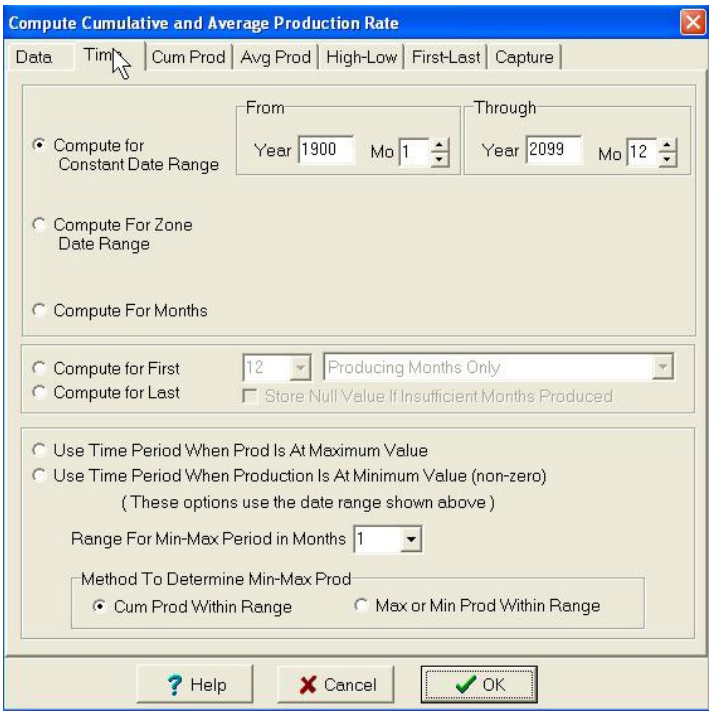
The following Compute Cumulative and Average Production Rate screen is displayed.



Important Note: Year 0 stores any production prior to the first year containing monthly values. These pre-monthly values are known as historical values.

2. Click the **Compute Values Using Following Monthly Production Stream** drop-down selection button and select the data stream that you want to compute the average production rate for. For our example, use Oil. Make sure the check box beside the **Include Historical (Year 0)** is checked. It's okay if the **Use Aliases** check box is checked. At this time, there are no aliases assigned.

3. Click the **Time Tab**.

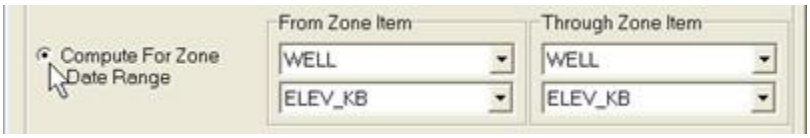


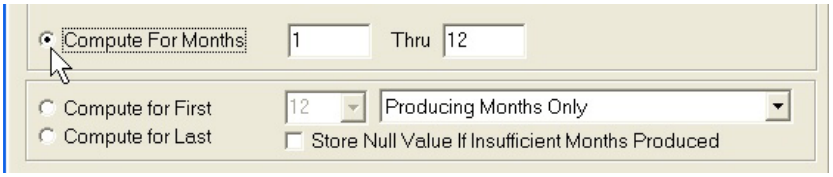
The options that are available provide you with a wide selection for computing values from the production data streams.

Options

The **Compute for Constant Date Range** option uses the From and Through sections to define the date range for selecting monthly data for the cumulative calculation.

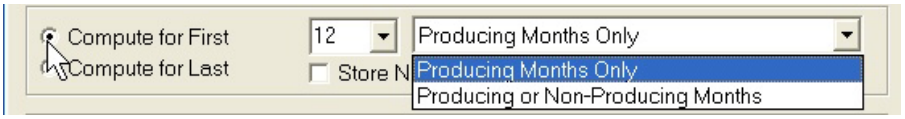
The **Compute for Zone Date Range** option uses the From Zone Item and Through Zone Item sections to define the date range for selecting monthly data for the cumulative calculation. You must have a date item with a date stored in the database to use this option.





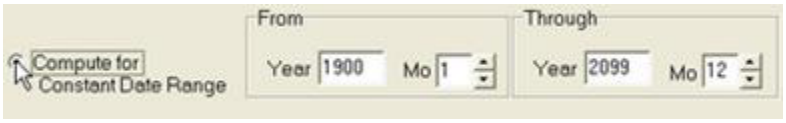
The **Compute for Months** option is used when you want to use a range of months.

The **Compute for First** option is used when you want to compute for the first range of months based on whether they are producing or producing and non producing. There are two radio button selection menus. The drop-down for the Compute for First 12 months is shown.



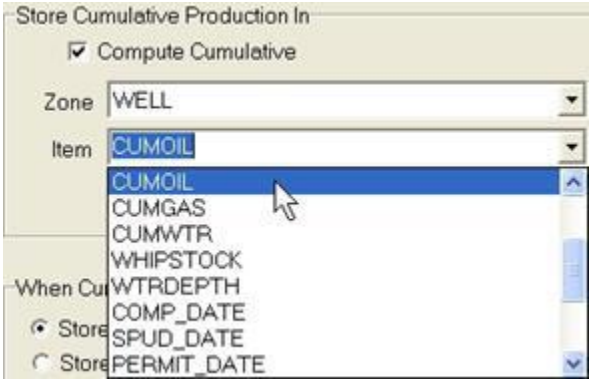
The **Compute for Last** option is used when you want to compute for the last range of months based on whether they are producing or non producing. There is a check box that can be checked to **Store Null Value If Insufficient Months Produced**.

Use the Compute for Constant Date Range option and use the default range of years and months for this tutorial exercise.

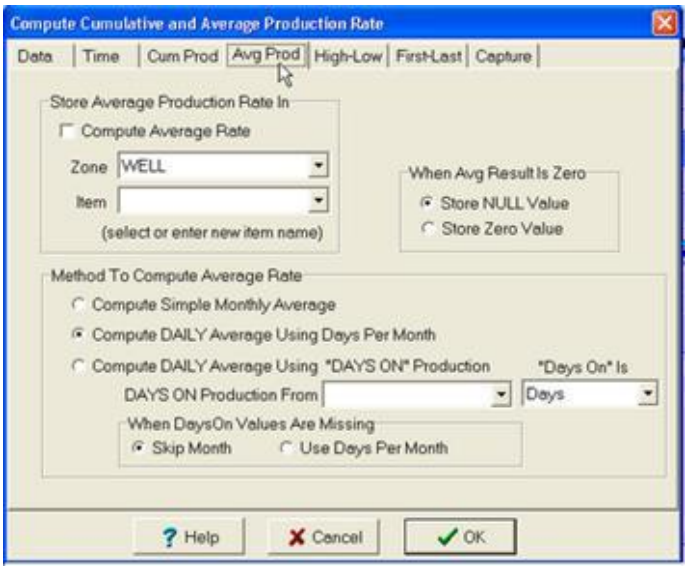


1. Click the **Cum Prod** tab.
2. Click the **Item** drop-down list button

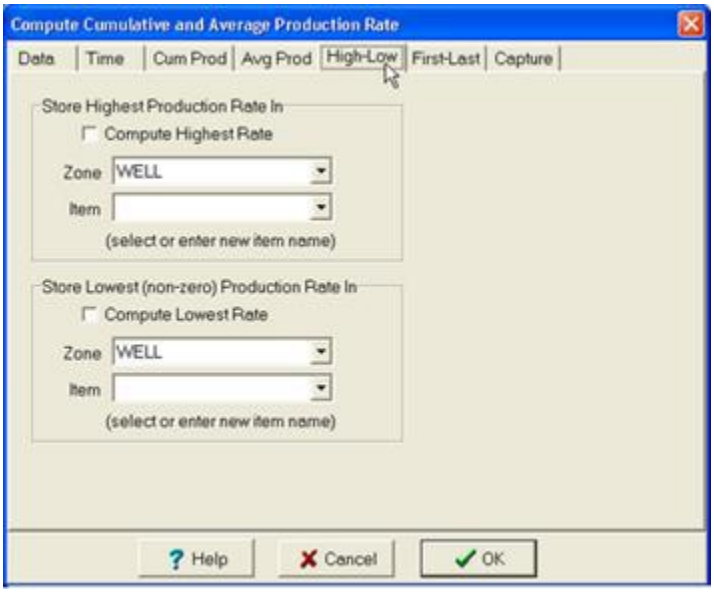
   to the right of the Item data field and select the CUMOIL data item.
3. Set the zone and item names of the Store Cumulative Results In section to the WELL zone or a zone name that you have created. The Item name was previously set to CUMOIL. You can type a different name if you do not want to use the default item name for this data.



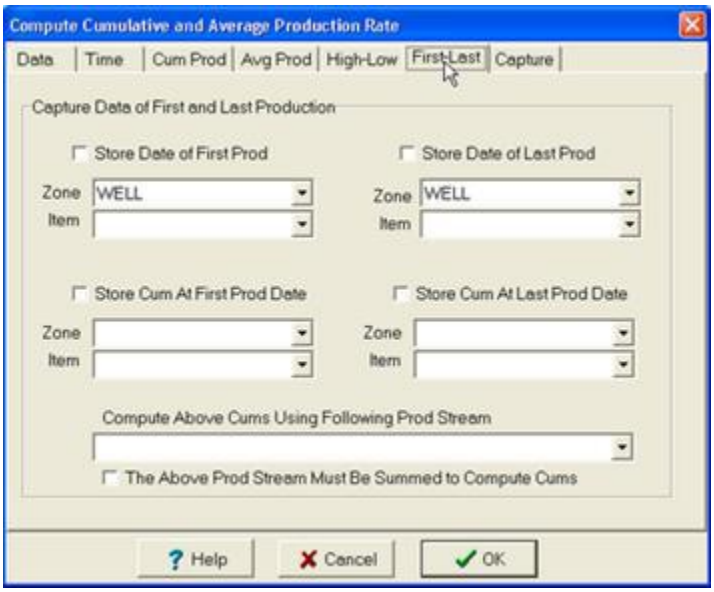
4. Click the **AvgProd** tab to view the options that are available. For this exercise, do not use any options on this tab.



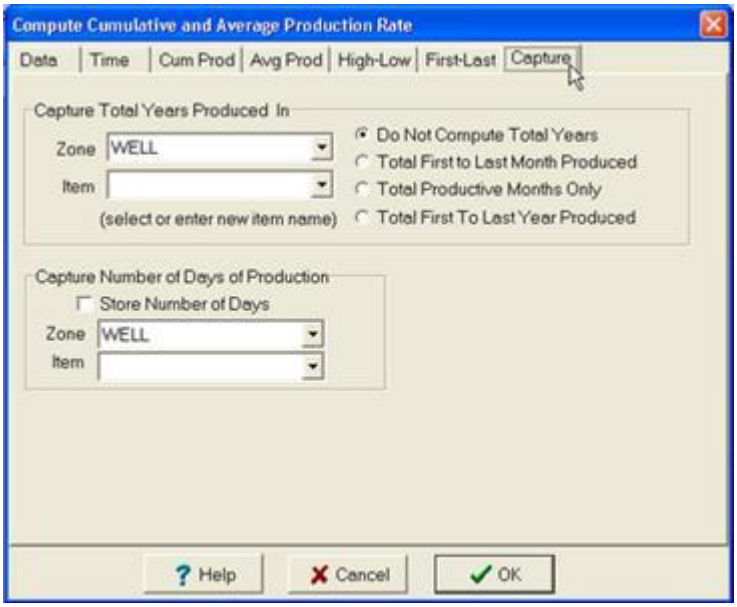
5. Click the **High-Low** tab to view the options that are available. For this exercise, do not use any options on this tab.

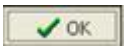


6. Click the **First-Last** tab to view the options that are available. For this exercise, do not use any options on this tab.



7. Click the **Capture** tab to view the options that are available. For this exercise, do not use any options on this tab.

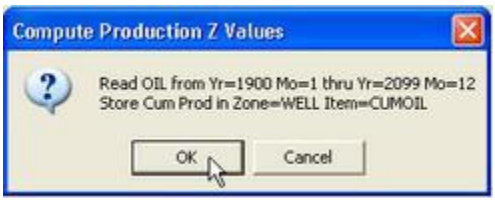


8. Click the **OK** button  with the green check to start computing cumulative values for the selected wells.

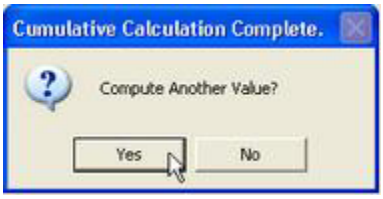
   You see a verification prompt displayed indicating the action about to be taken.

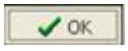
To proceed with this process,

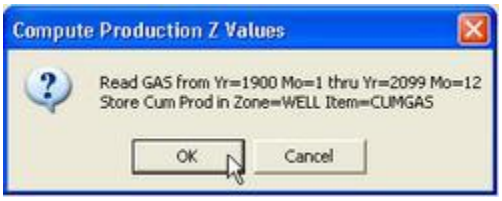
1. Click the **OK** button.



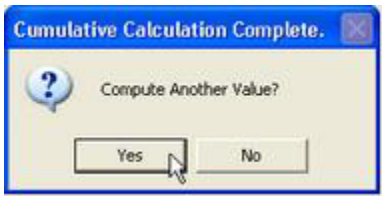
   When the calculation progress bar completes, you see a prompt to Compute Another Value? Click the **Yes** button.



2. Repeat the cumulative calculation for gas production.
3. Click the **Data** tab and select the GAS production variable in the Compute Values Using Following Monthly Production Stream drop down list.
4. Click the **Cum Prod** tab, and select the **WELL** zone and **CUMGAS** item.
5. Click the **OK**  button with the green check on the ***Compute Cumulative and Average Production Rate*** dialog screen to start the computation.
6. Click the **OK** button on the Compute Production Z Values verification for the CUMGAS calculation to proceed.

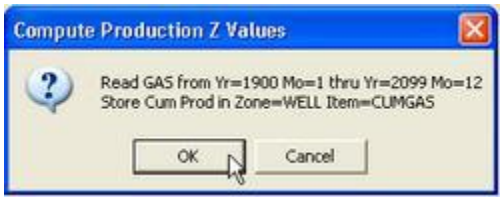


   When the calculation progress bar completes, you see a prompt to Compute Another Value? Click the **Yes** button.

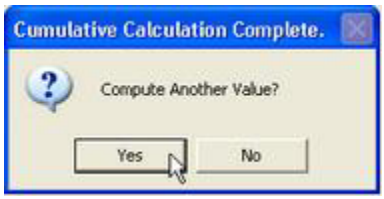


Repeat the cumulative calculation for water production and do the following:

1. Click the **Data** tab and select the **WTR** production variable in the **Compute Values Using Following Monthly Production Stream** drop-down list.
2. Click the **Cum Prod** tab, and select the **WELL** zone and **CUMWTR** item.
3. Click the **OK** button with the green check on the ***Compute Cumulative and Average Production Rate*** dialog screen to start the computation.
4. Click the **OK** button on the Compute Production Z Values verification for the CUMWTR calculation to proceed.



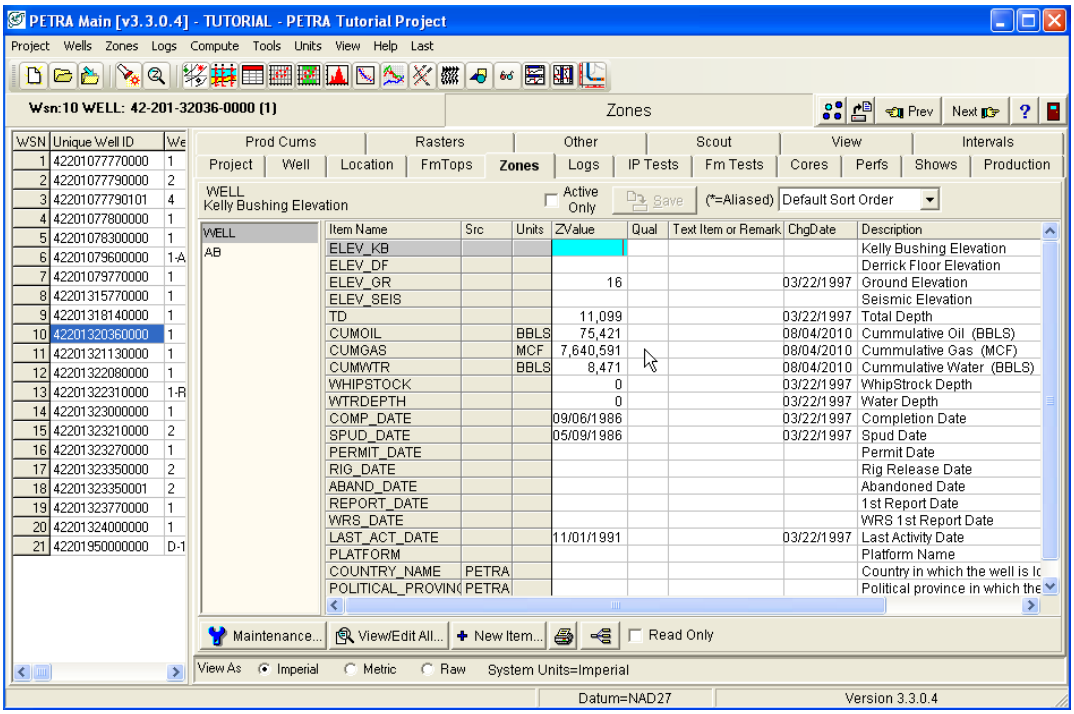
When the calculation progress bar completes, you see a prompt to Compute Another Value? Click the **No** button.



5. To see the newly computed cumulative values, click **WSN** 10, and then click the **Zones** tab in the Main module.

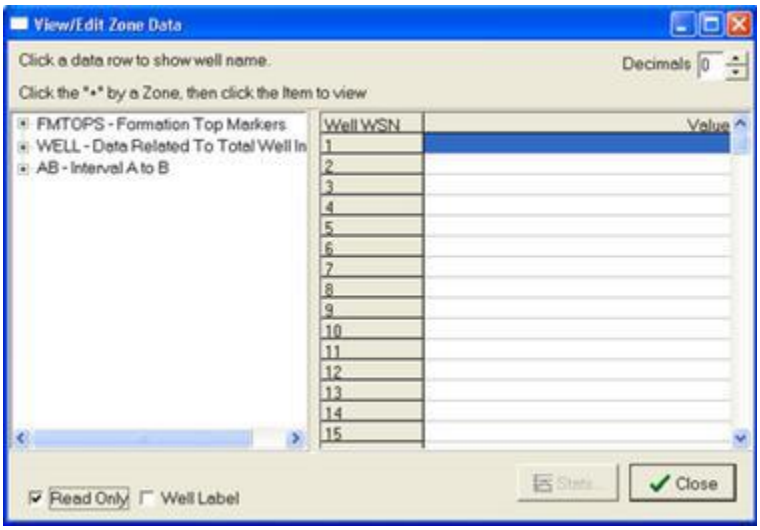
   You see the values that have been computed for CUMOIL, CUMGAS, and CUMWTR for the wells that have production loaded.

Note: There are several wells that do not have any production loaded.



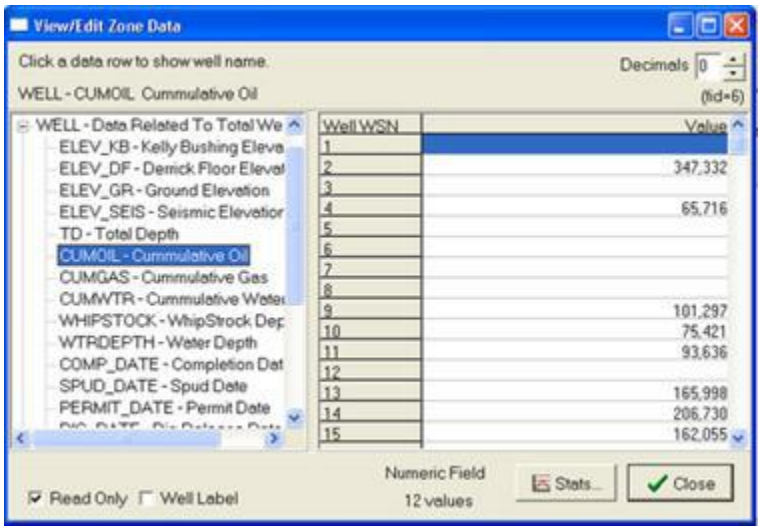
To view the cum data items from the Well zone for more than one well, do the following:

1. Click the **View/Edit All..** button at the bottom of the Zones tab. The following dialog screen is displayed.


View/Edit Zone Data
Click a data row to show well name.
Decimals
Click the "+" by a Zone, then click the Item to view
FMTOPS - Formation Top Markers
WELL - Data Related To Total Well In
AB - Interval A to B
Well WSN
Value
Read Only
Well Label
Close

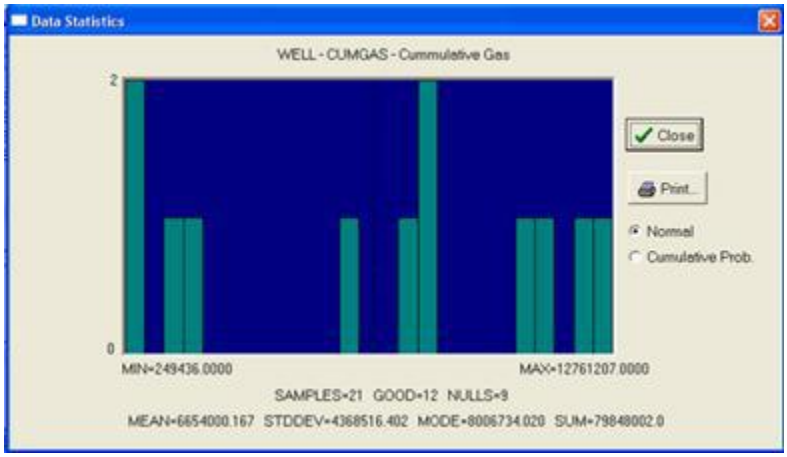
2. Click the **plus** + to the left of the Well zone.

   The following dialog screen is displayed.



3. Click the **CUMOIL** data item to show the values for each well. You can use the scroll bar on the right to scroll through the wells. Do the same for the CUMGAS and CUMWTR data items.

   The Stats button shows a histogram showing the data range and frequency distribution of the cumulative gas production.



4. Exit the histogram by clicking the **Close** button with the green check on the Data Statistics screen, and close the View/Edit Zone Data screen by clicking the **Close** button with the green check located at the bottom of the View/Edit Zone Data screen.

Prod Cums Tab

From the Main screen,

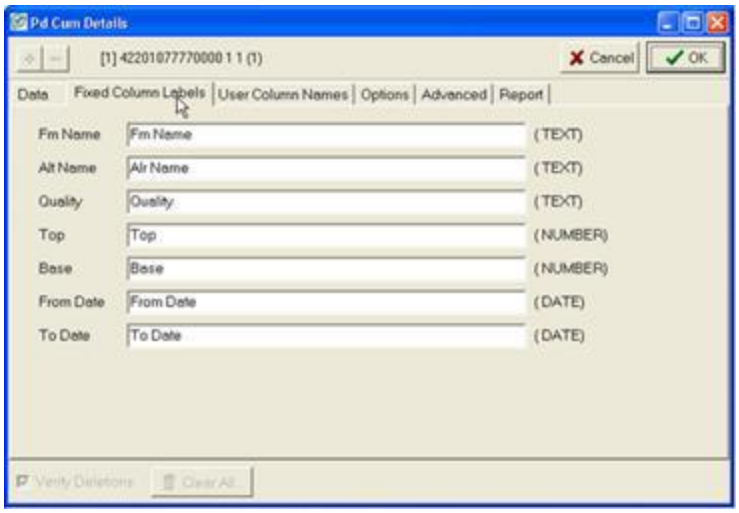
1. Click **WSN 2**, and then click the **Prod Cums** tab.

   Note: The Sample and Tutorial data sets does not have any data loaded for this table.

2. Click the **Details...** button to add data to the Prod Cums table and to manage the User Column Names. This table was designed to be a User defined table.

3. Click the **Fixed Column Labels** tab. These data items are System items. The Item name cannot be changed or deleted; however, the Column Label can be changed. The displayed label is the Column Label that is displayed for the data field. The default column labels are shown below.

4. If you want to change the Column Label, click the name that you want to change, **Fm Name** for instance, and change it to the Column Label name that you want to see displayed.

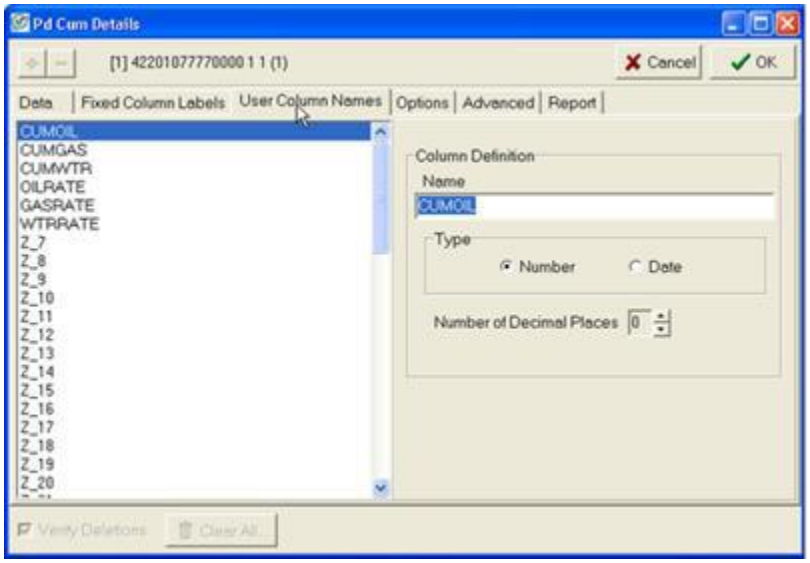


There are fifty user defined columns with a data type that can be set to either a Number with a specified number of decimal places or as a Date. You can change the Column names from the default that is shown to something more meaningful to you.

5. Click the User Column Name that you want to change, for instance, **CUMOIL**.

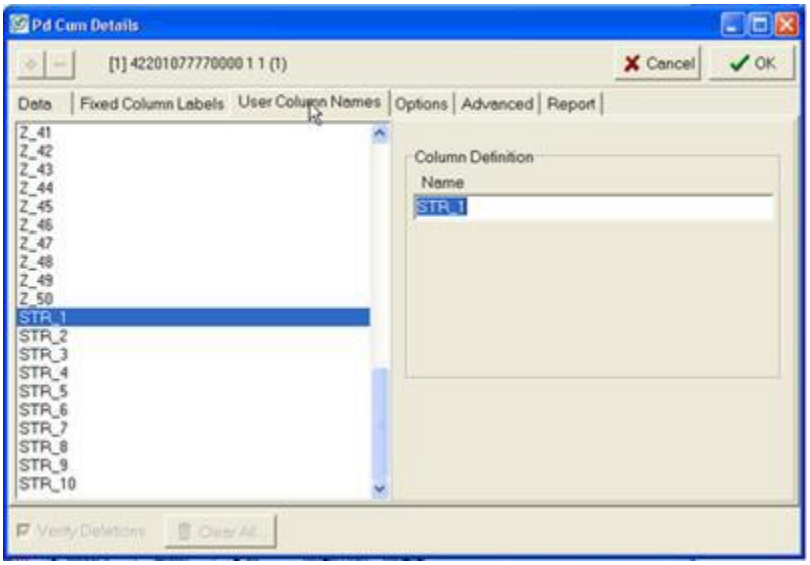
   The name is displayed in the Column Definition Name data field where you can type over the name. You can change the Type to either Number and specify the number of decimal places for that Column, or change the type to Date. If you change the Type to Date, the data entered must be in a date format.

6. Click the **Options** tab to set the date format. The default is mm/dd/yyyy.

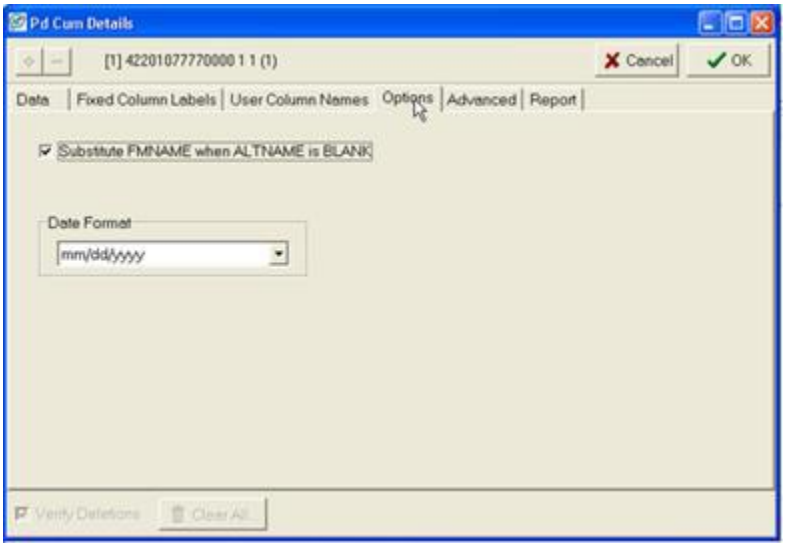


7. Grab the Scroll bar to scroll to the bottom of the list to see the ten string columns.
8. Click the User Column Name that you want to change, for instance, **STR_1**.

   The name is displayed in the Column Definition Name data field where you can type over the name.

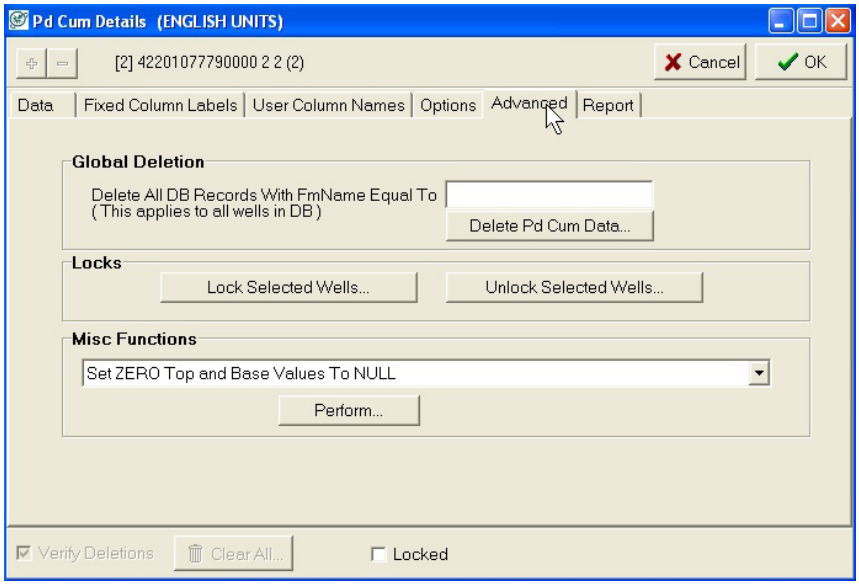


9. Click the **Options** tab. You can select the format for the Date columns and specify if you want the ALTNAME to be substituted for the FMNAME when the data field is blank.



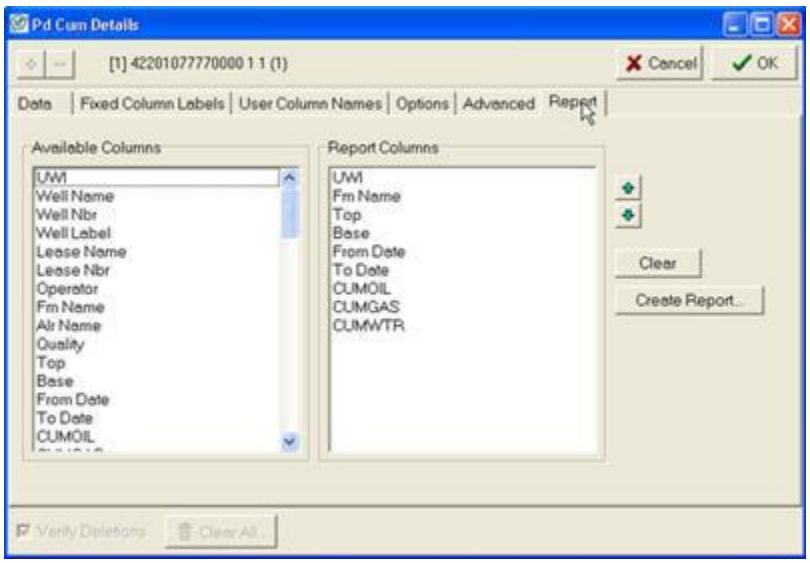
10. Click the **Advanced** tab. You have an option to delete all records in the Pd Cum table that meet the specified criteria. There are options to Lock Selected Wells…, Unlock

Selected Wells and a Misc Functions option to Set ZERO Top and Base Values To Null.



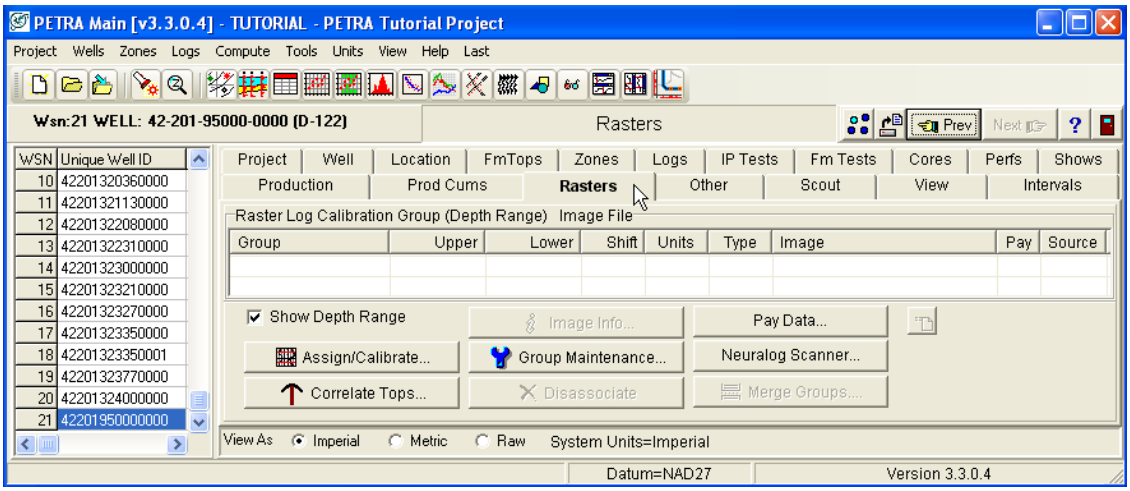
11. Click the **Report** tab. You have the ability to set up a report that is written to an. csv file with the columns that are specified in the Report Columns section.

12. To add more items to the Report Columns section, double-click the item in the **Available Columns** section. You have the ability to move the item up or down the list by clicking the item that you want to move and then click the **Move Up** button or the **Move Down** button to move the item.



Rasters Tab

From the Main screen, click the well WSN 21 and then click the Rasters tab.



Note: You do not see the Pay Data... button as shown above unless you click the **Compute→From Logs→Extract Raster Pay To DB Table...** menu and click the **OK** button on the ***Extract Raster Pay To DB*** confirmation dialog screen.

The Merge Groups… button is grayed out until you have assigned groups for the rasters and select two or more groups to merge together.

Extract Raster Pay To DB
All pay data currently stored in the raster calibration files for the current 21 wells will be copied to the "paydata" DB table.
OK
Cancel

Raster log images can be assigned to a well and displayed using the cross section module. Each raster log image must be depth calibrated before it can be displayed. Many times, the edges of the tracks are curved due to the paper stretch or slippage while being scanned. A tool has been provided in PETRA to straighten a crooked image using some dummy depth calibrations. After the image has been straightened, the dummy depth calibrations are cleared, then depth calibrated and assigned to a well.

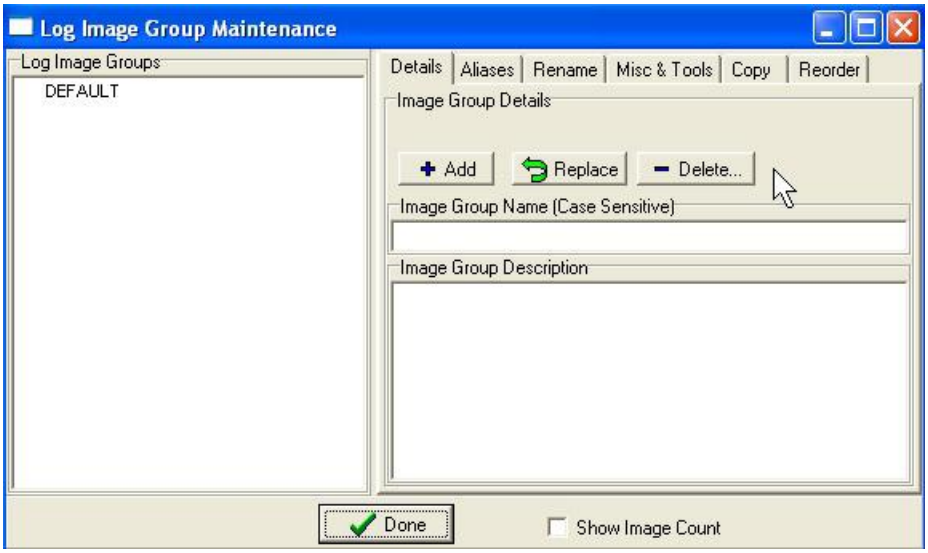
Read the section Cross Section with Raster Images for the details on using the straightening, depth calibration, digitizing tools, and understanding image groups.

Images can be either TIF, JPG, or BMP files and can be located anywhere on your computer or network. An Images Folder, in your project's public Folder, has been created as a convenience for you. Each calibrated log image has an associated text file containing calibration information generated by this function. This file is a Log Image Calibration file and has an extension of .LIC.

The **Group Maintenance**

button is used to perform various maintenance items for the Rasters you have assigned to the wells in the database. You can create and/or update log image group names, assign aliases, rename groups, print a group list, delete all or selected groups, resolve image paths, clear MJ LogSleuth Flags, add well records to the LIC file, repair and synchronize LIC file groups, Find and replace LIC/TIF path prefixes, Delete uncalibrated rasters, and copy Image Files to a specified folder.

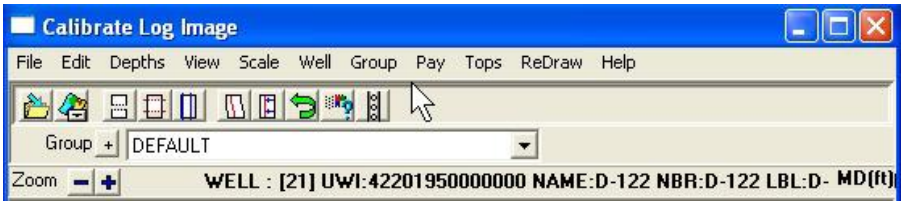
Click the **Group Maintenance** button to bring up the ***Log Image Group Maintenance*** dialog screen. The various options can be found by clicking on the different tabs.



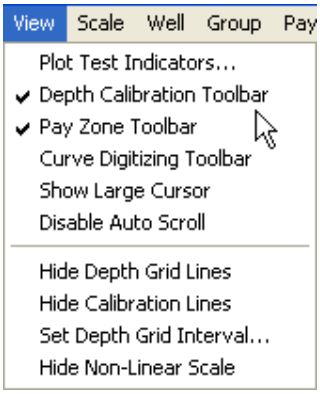
Use the **Add, Replace,** and **Delete** buttons to manage the groups.

The **Assign/Calibrate**

button is used to display the calibration dialog screen. **You can straighten, calibrate, and DIGITIZE scanned raster log images and assign them to a well without opening the Cross Section module.**

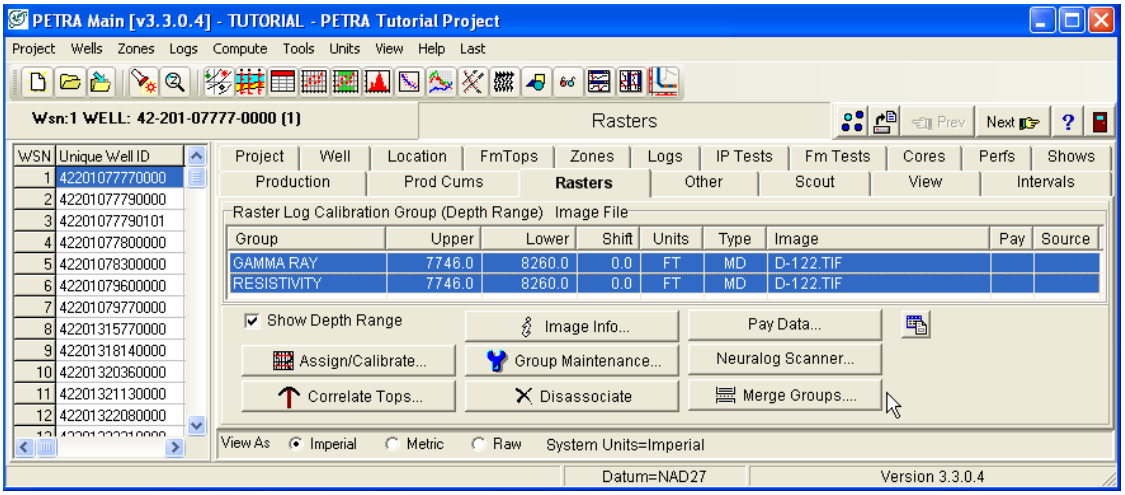


Across the top of the screen is a series of menus and icons. All of the menus are drop-down except for the ReDraw menu. Click the **View** drop-down menu for specific operations that can be turned on and off.



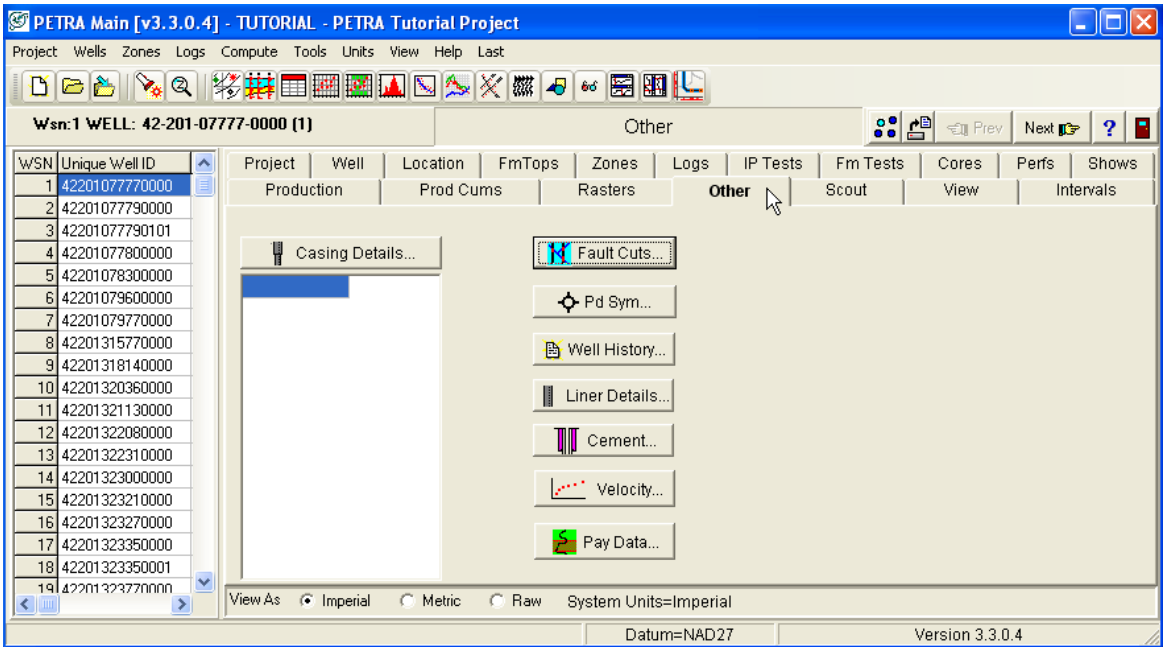
Note: There are options that will be greyed out until you add and calibrate an image. These are Depth Calibration Toolbar, Pay Zone Toolbar, and Curve Digitizing Toolbar.

Note: The Merge Groups… button is grayed out until you have assigned groups for the rasters and select two or more groups to merge together as shown in the image below.



Other Tab

From the Main screen, click the **Other** tab.



Data for Casing Details…, Fault Cuts…, Pd Sym…, Well History…, Liner Details…, Cement…, Velocity… and Pay Data… are accessed from this tab.

Casing Details

Click the **Casing Details**

button to view Casing data details.

Values that can be loaded into the Casing table are: Depth, Size, Units, Amount, Units, and Remarks.

Fault Cuts

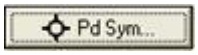
Click the **Fault Cuts**

button to view the Fault Cut Details data.

Values that can be loaded into the Fault Cuts table are: Depth of Fault Cut, Amount of Section Missing, and a Description. You can set the depths as MD or TVD. You can set a color for the fault cut.

Note: In the Map Module, the items in the Fault Cut Tables can be turned on at each well with their respective colors.

Production Symbols (Pd Sym)

Click the **PD Sym…**  button to view Production Symbols data details.

Production Symbols are depth referenced well symbols stored in each well. These well symbols can be plotted on cross sections on the depth track to indicate various producing zones. Optionally, each well symbol can have a remark posted beside it on the cross section.

To assign a production symbol to a well

1. Select the well from the main module's well list and click the **Other** tab.
2. Click the **Pd Sym** button to open the Production Symbol data entry screen.
3. Enter a measured depth, select a well symbol and color, enter any remarks you might want posted.
4. Click the Add New Symbol Depth button.

Post production Symbols on the cross section

1. Open the Cross Section module.
2. Select the **Wells → Plot Test Indicators** menu option where production symbols can be activated.

   The production symbols are plotted in the center of the depth track. Well symbol thickness can be set using the **Display → Colors** menu option.

Well History

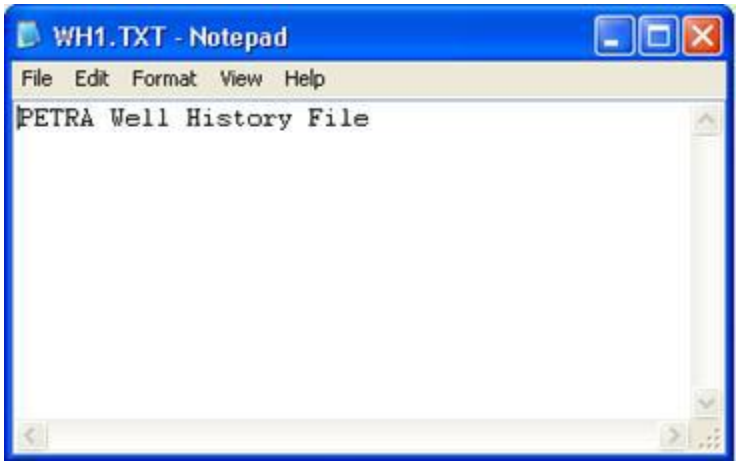
For Well History,

1. Click the **Well History…** button to view the Well History file associated with the selected well.

   A text document can be assigned to each well.
2. Click the **Well History...** button. The following dialog screen is displayed if there is not a Well History file associated with the selected well:

3. If you want to create a Well History file that is associated with this well, click the **Yes** button; otherwise, click the **No** button.

   If you click **Yes**, the following notepad file is displayed.



4. Enter the data that you want to display in the associated text file below PETRA Well History File. Remember to save the file.

Liner Details

Click the **Liner Details…** button to view Liner Details data.

Values that can be loaded into the Liner Details table are Top Depth, Base Depth, Size, Units, Date, and Comment.

Cement

Click the **Cement…** button to view Cement details data.

Values that can be loaded into the Cement table are Top Depth, Base Depth, Date, and Comment.

Velocity

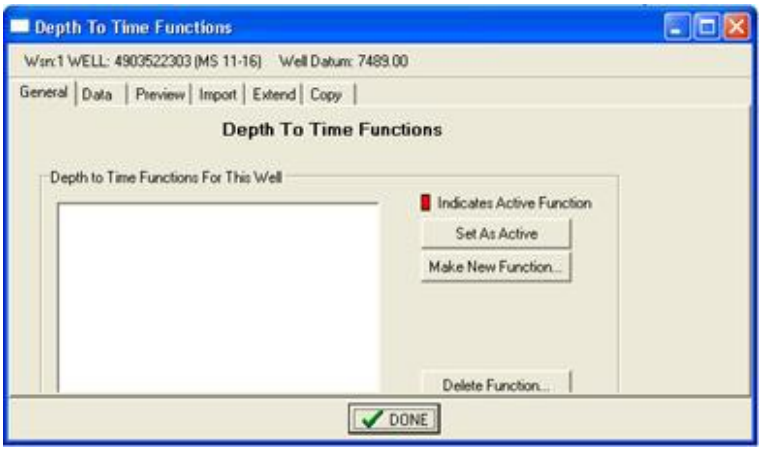
Click the **Velocity…**

button to view the ***Depth To Time Functions*** dialog screen.

Pay Data

Click the **Pay Data…**

button to view the ***Pay Interval Data (all Shown)*** dialog screen.



All velocities for PetraSeis are now stored in PETRA. You can find these by clicking the **Other** tab and clicking the **Velocity...** button.

Read the PetraSeis manual to learn more about this feature. Look in the Table of Contents for Velocity Functions.

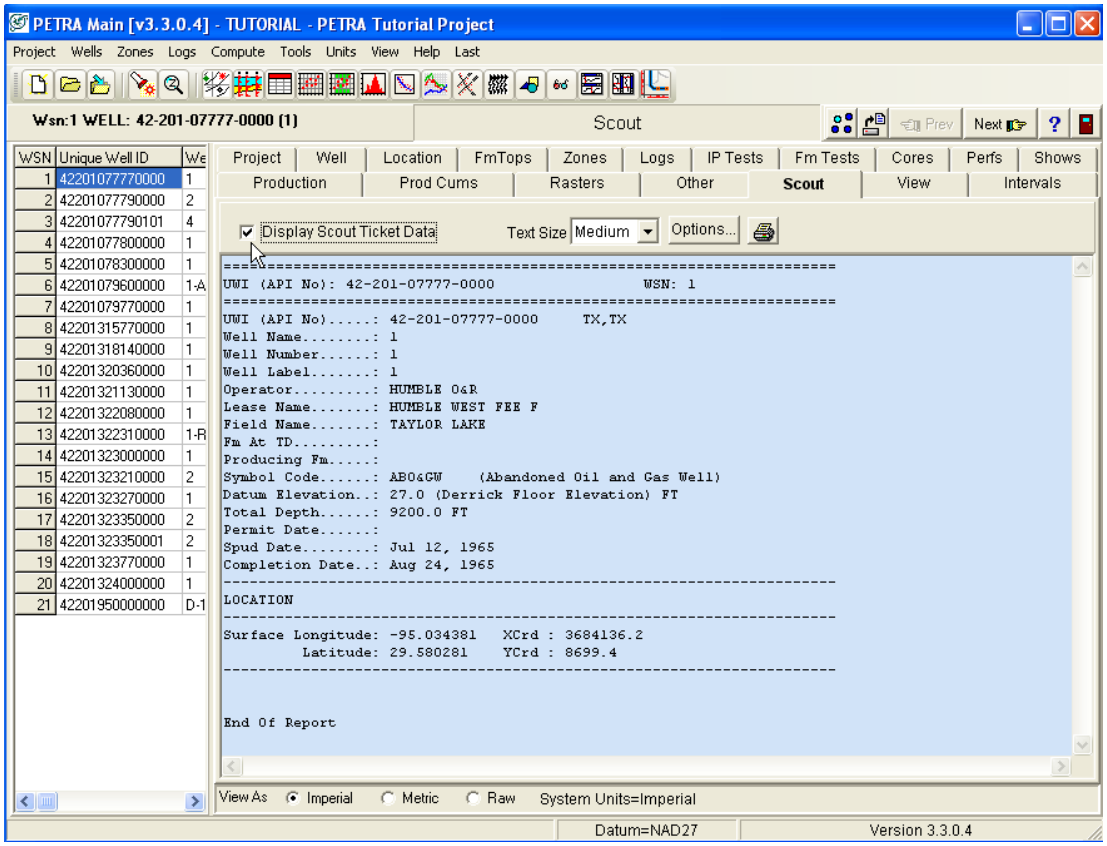
Scout Tab

From the Main screen,

1. Click the **Scout** tab, click **WSN 1**, and then click the **Display Scout Ticket Data** check box.

   A scout ticket report is a well report showing selected data items for each well in the project. Several options are available to filter what data actually gets included in the report. You can change the size of the text by clicking on the drop-down button to the

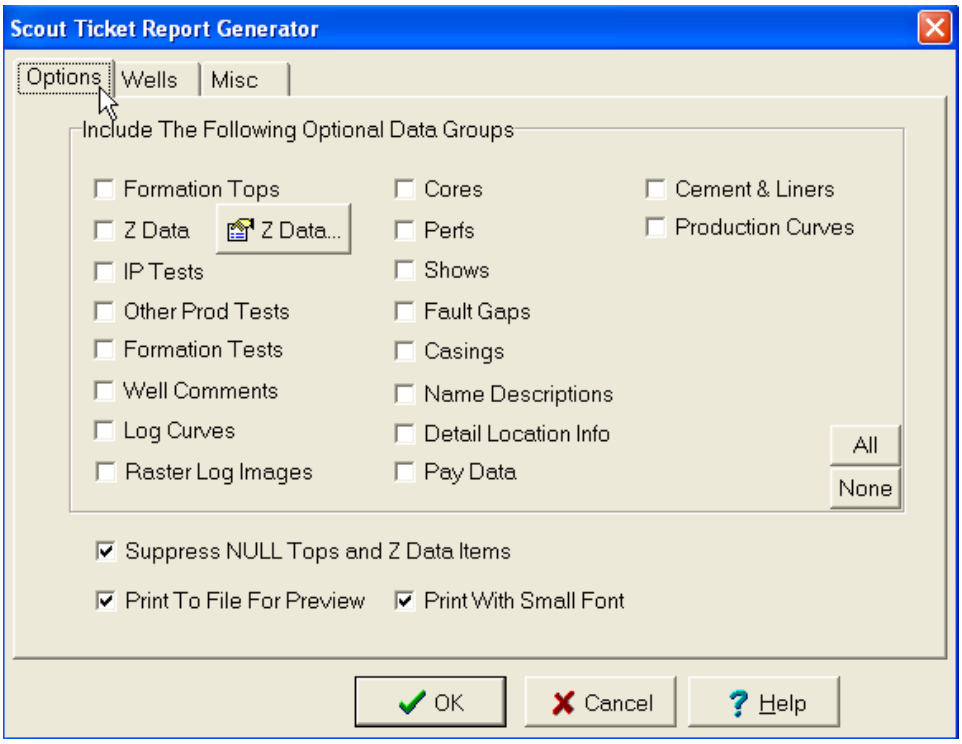
right of the **Text Size** option. The choices are **Small**, **Medium**, and **Large**.



2. Click the check box to the left of **Display Scout Ticket Data** to display the scout ticket information.

3. Click the **Options...** button to display the ***Scout Ticket Report Generator*** dialog for selecting information to be displayed in the report, which well(s) to create the report for,

and other criteria.

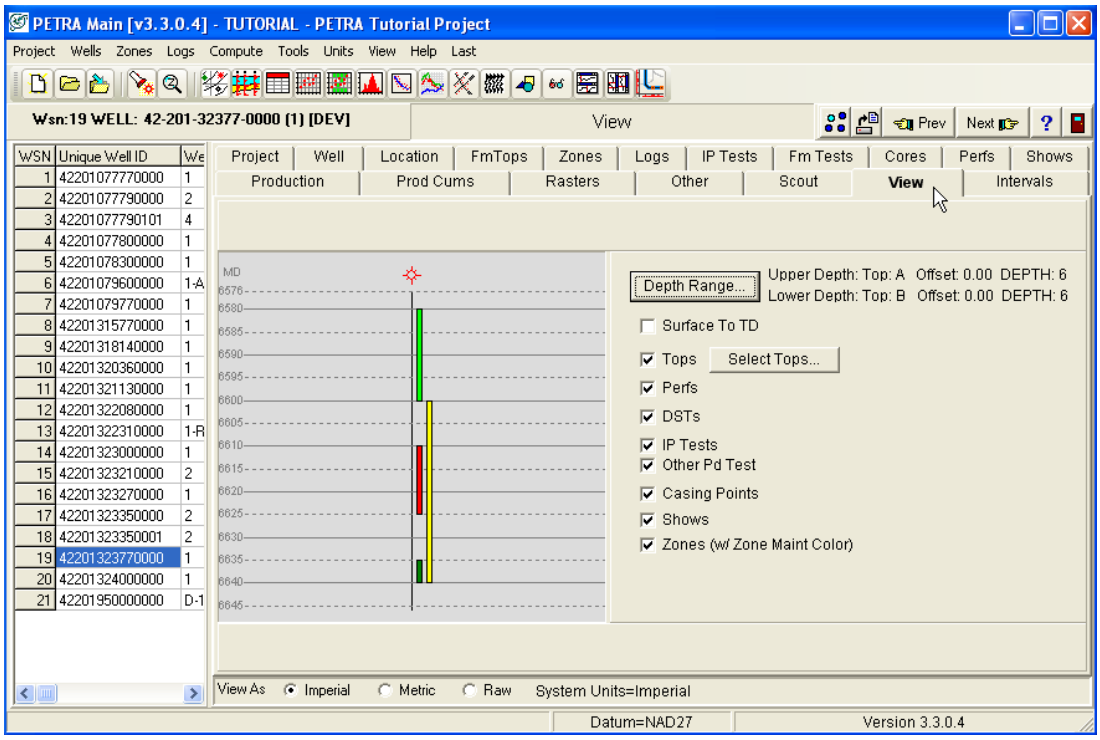


View Tab

From the Main screen,

1. Click the **View** tab.
2. Click **WSN 19** to display that well.
3. Click the **Depth Range…** button to set the **Upper and Lower** depths. For this exercise, **Top A** was selected for the Top depth and **Top B** was selected for the Lower depth.

4. Click the check box to the left of the various items that you would like to see displayed, if there is data for those items in the database tables.

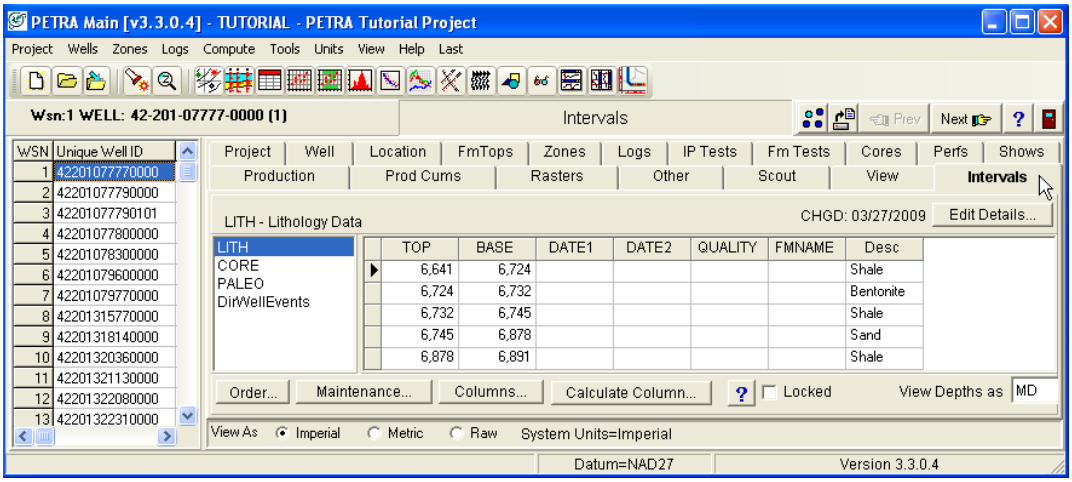


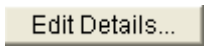
Intervals Tab

From the Main screen,

1. Click the **Intervals** tab.

2. Click **WSN 1** to display that well.



3. Click the .**Edit Details…** button 

to display the Edit Interval Data dialog screen and add or change data associated with the intervals.

Note Interval data stores data to a specific depth interval that doesn't fit well with the traditional zone concept, such as data that is too fine (such as core descriptions) or too coarse (such as mud weights or biostratigraphic information) to fit inside two formation tops.

PETRA stores interval data in tables and fields similar to a spreadsheet. The table stores related interval data in a spreadsheet where each interval is stored as a separated row. This data can be used to derive grids in the map module, perform additional computations within the PETRA database, illustrate in PETRA's cross-section tool, and convert into digital logs.

Inside a table, each interval is stored as its own row, and information about that interval is stored in fields or columns in that row. All tables come with a few fields, TOP, BASE, DATE1, DATE2, QUALITY, and FMNAME, but you can add **user-defined fields** containing numbers, dates, or text. In addition to the standard fields, the LITH table in the example below contains the field **Desc** which stores lithologic descriptions.

5

Log Image Calibration

All raster logs must first be depth registered (calibrated) before they can be positioned correctly on a Cross-Section. PETRA includes a tool to depth register an image and assign it to a well. Images can be TIF, JPG, or BMP files and can be located anywhere on your computer system or network. An Images Folder, in your project's public Folder, has been created for your convenience to store the calibration files and images for the project. Each calibrated log image has an associated text file containing calibration information. This file has an extension of LIC and is called a Log Image Calibration file.

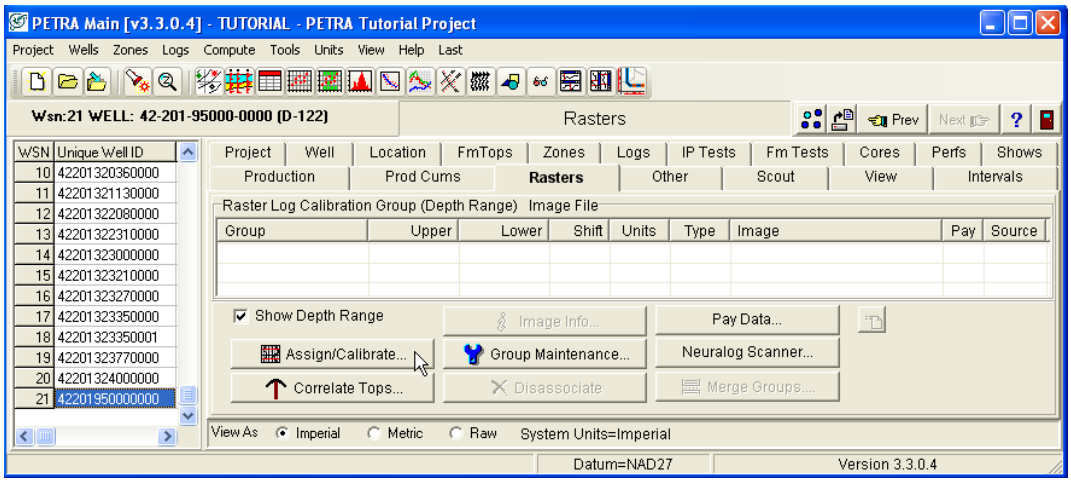
To begin using the log calibration features,

1. Navigate to the Main module.
2. Make sure that you click and highlight **WSN 21**, which has an image in the Tutorial project.

- In the Main module, click the **Rasters** tab, and then click the **Assign/Calibrate...** button.

.

The Calibration Log Image module is displayed.



Once you get to the Calibrate Log Image dialog screen, either from the Main module or from the Cross Section module, the calibration/log straightening procedure is the same. When the Calibrate Log Image dialog screen is displayed, you see

- The Menu items at the top
- A series of icons
- A Group selection with the DEFAULT image group name displayed and a drop-down arrow to the right
- A Zoom control for the image
- The well that has been selected prior to coming into the Calibrate Log Image dialog screen.

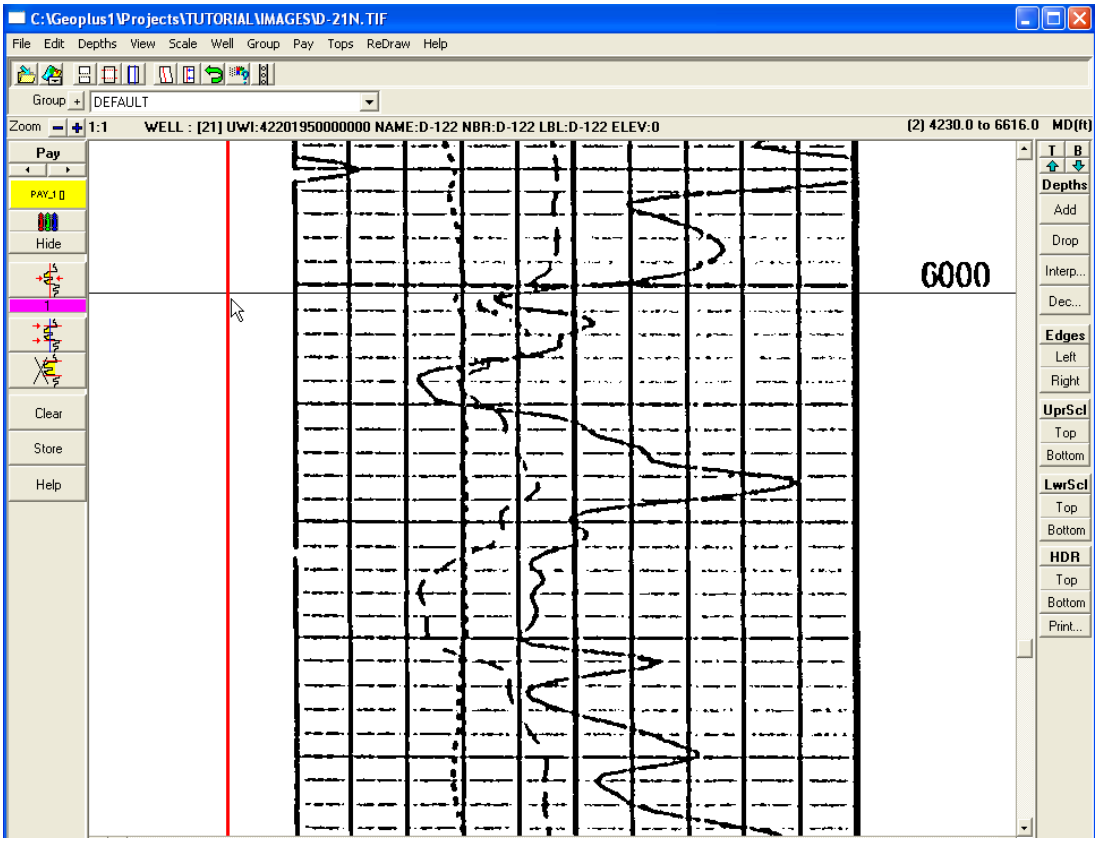
Calibrate Log Image
File Edit Depths View Scale Well Group Pay Tops ReDraw Help
Group
DEFAULT
Zoom
WELL : [21] UWI:42201950000000 NAME:D-122 NBR:D-122 LBL:D-122 ELEV: MD(ft)

In addition to calibration, crooked images may be straightened prior to use. The following section, *Straightening An Image*, describes how to straighten an image. If your image does not need straightening, then proceed to the *Depth Calibration – Log Image* section, which covers depth calibration.

Straightening an Image

Many times, the edges of the log tracks are curved due to paper stretch or slippage. When images appear to snake across the screen as you scroll down the image, a page has stretched or slipped during a scan, and the edges of the log tracks are curved. An example of this type of snaking line is shown below. The first image shows the edge at the top (Depth 4232 to 4278 with no gap between the left border and the image. The second image is shown at 5988 to 6046 feet. Notice the wide gap between the left border and the image in the second display. This gap keeps changing as you scroll down the image.

The image below shows the gap between the straight edge and the left edge of the image.



It is possible, with a PETRA tool, to straighten a crooked image. Go through the following steps to straighten an image using an image located in the X:\Geoplus1/Projects/Tutorial?images folder with the name D-122.tif. In this example, WSN 21 is selected as the well to assign the scanned raster image to.

The following steps give you options for accessing the Calibrate Log Image module.

1. From the Main module, scroll down the well list and click **WSN 21**.
2. Click the **Rasters Tab**.

   You see several buttons on the dialog screen. Note the Assign/Calibrate button

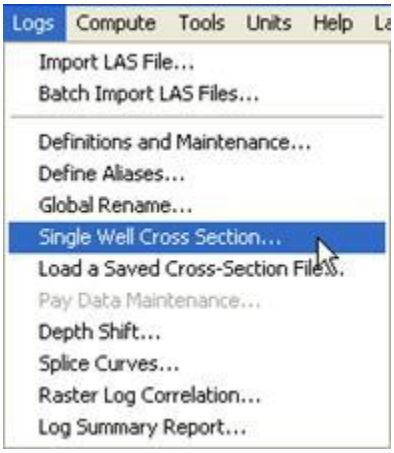
and the Group Maintenance button

. The Group Maintenance button is not being used in this example, which uses the system group called DEFAULT.
3. Click the **Assign/Calibrate** button to bring up the ***Calibrate Log Image*** dialog screen.
4. From the Map module, you need to select the well to be used in the cross section; therefore, click the **Well To Well Cross Section** icon.

The cursor changes to cross hairs with a ? to the right.

5. Move the cross hairs over the well with **WSN** (Well Sequence Number) **21** and click with the left mouse button, and then right click to end the well selection for the cross section. This brings up the cross section module with the well selected.

6. You can also select a single well cross section from the Main module by clicking the well that you want to display in the cross section, which in this case is **WSN** (Well Sequence Number) **21**, and then clicking the **Logs→Single Well Cross Section...** menu.



From the Cross Section module, there are a couple of ways to bring up the log calibration dialog screen.

1. Click the **RasterLogs→Log Image Calibration…** menu.

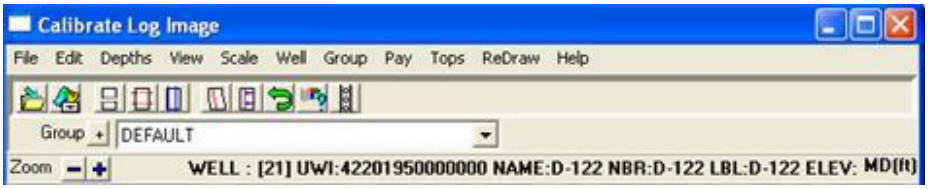
OR

2. Right click the well in the cross section to bring up the following dialog screen:

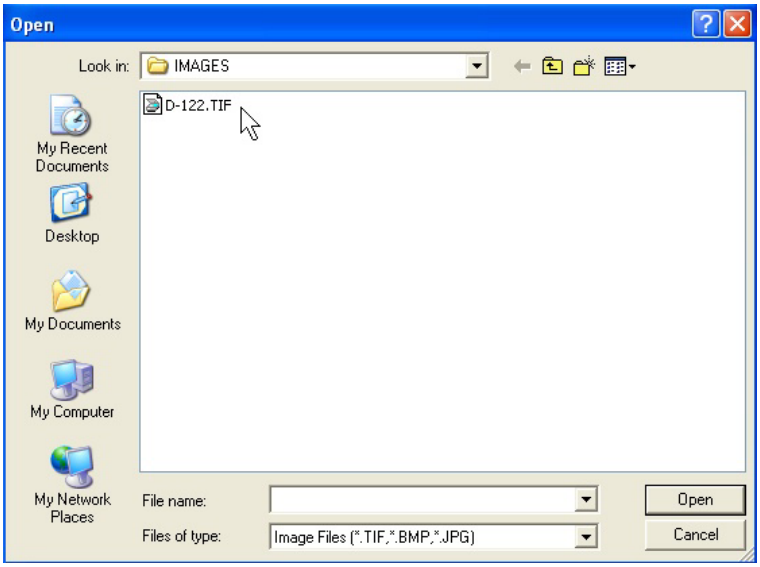
Calibrate Log Image...
Redraw
Well Info
User Favorites
User Favorite Strat Intervals
User Favorite Structure Intervals
Set Raster Template For This Well Only...
Enable Raster Template For This Well...
Disable Raster Template For This Well...
Show Raster Image Details...
Set Log Curve Scales...
Convert Real Well To Pseudo Well...
Log Type For This Well
Drop Well From Section...

Once you get to the ***Calibrate Log Image*** dialog screen, either from the Main module or from the Cross Section module, the calibration/log straightening procedure is the same.

When the ***Calibrate Log Image*** dialog screen is displayed, you see a series of drop-down menus across the top, a row of icons, then the Group section with the DEFAULT image group name, and then the Zoom controls and the well information that has been selected prior to coming into the ***Calibrate Log Image*** dialog screen.


Calibrate Log Image
File Edit Depths View Scale Well Group Pay Tops ReDraw Help
Group DEFAULT
Zoom
WELL : [21] UWI:42201950000000 NAME:D-122 NBR:D-122 LBL:D-122 ELEV: MD(ft)

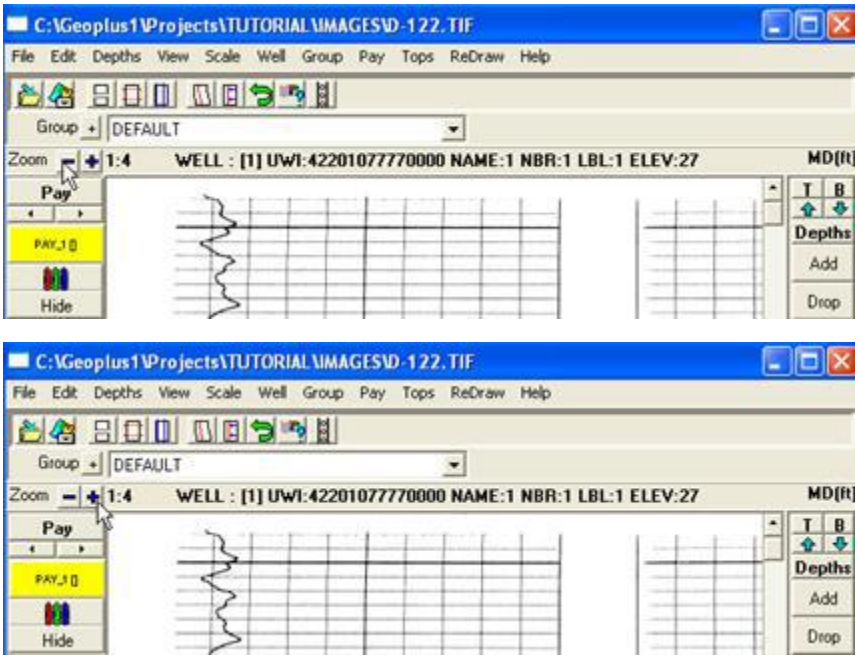
1. Load the image into the ***Calibrate Log Image*** dialog screen by clicking the **File→Open Image…** menu.



2. Click the **D-122.tif** image, and then click the **Open** button, and then after the image is loaded, click the **Zoom - +** buttons.

   The display scale changes so that you are able to see more or less of the image. An example of the image, as it is brought into PETRA and clicking on the Zoom - & + buttons

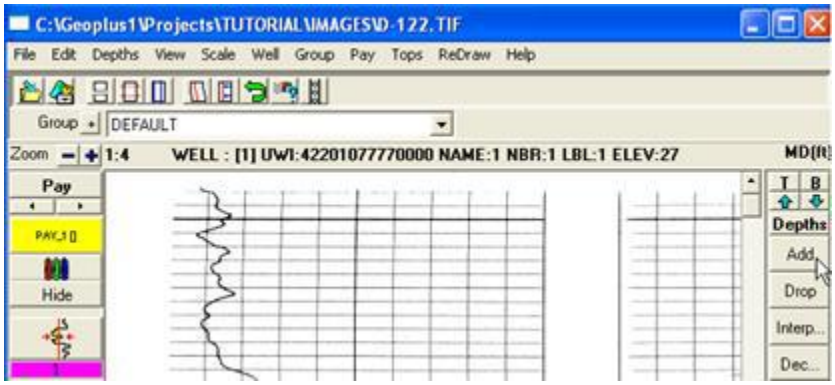
, is displayed below.



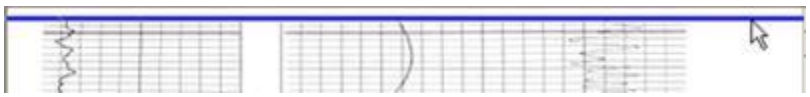
3. Add some depth calibration control points to the image. Use an arbitrary 0 to 100 scale and interpolate the depths every 20 feet. There are four depths that are automatically generated.

4. Add two depths, one at the extreme top of the image as depth 0, and another at the extreme bottom of the image as depth 100.

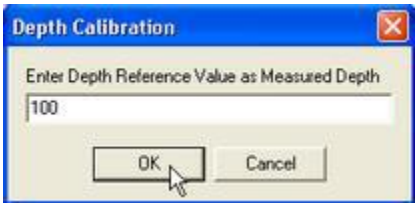
5. Click the **Depths→Add Depth Point** menu or the **Depth Calibration** toolbar, **Depths**, **Add** button.



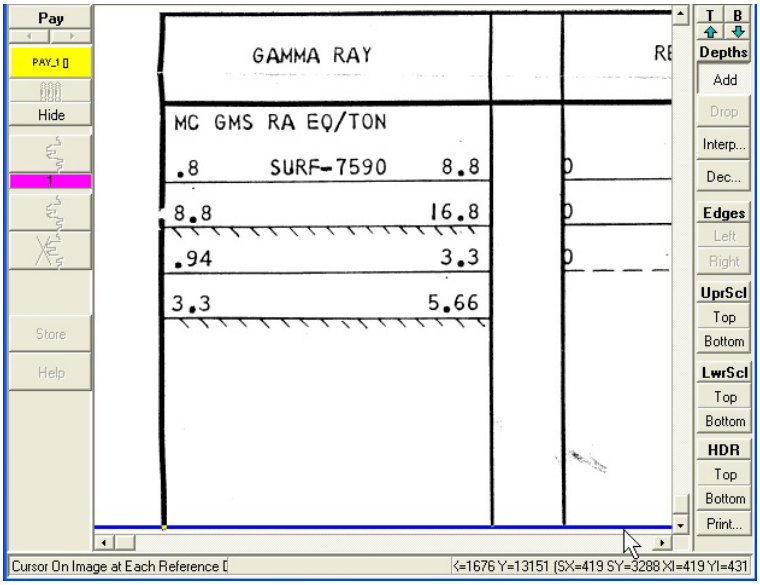
6. Position the blue add depth line at the extreme top of the image and click the left mouse button.



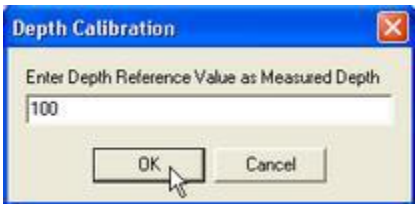
7. Enter a 0 for the depth reference, and then click **OK**.



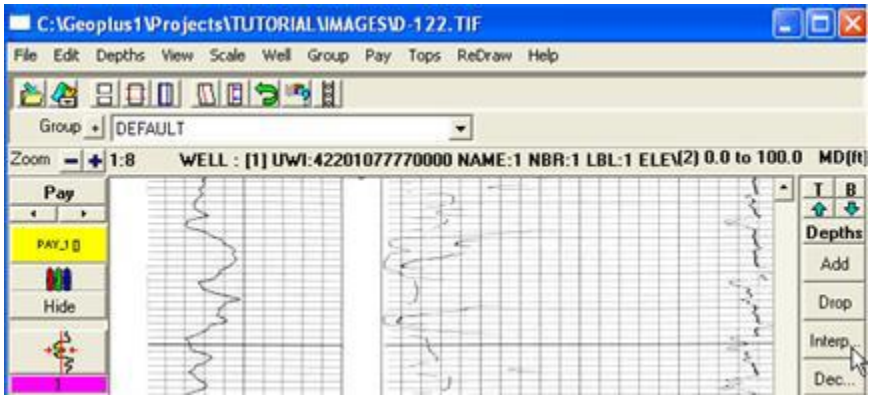
8. Scroll to the extreme bottom of the image, position the blue add depth line at the bottom of the image, and then click the left mouse button.



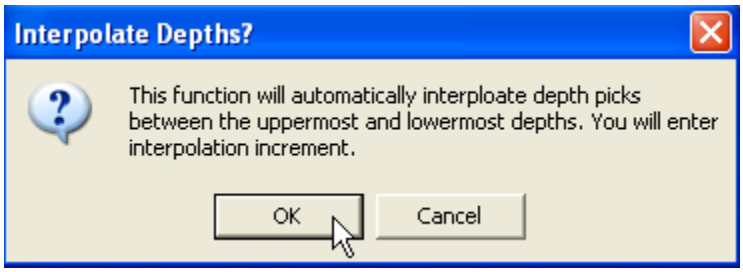
9. When the ***Depth Calibration*** screen is displayed, enter a value of 100 for the depth reference, and then click **OK**. Right click to end the Add depth option. (You can also click the **Add** button to end the depth capture routine.)



10. Click the **Depths→Interpolate Depths…** menu or the **Depth Calibration t**oolbar, **Depths**, **Interp…** button.

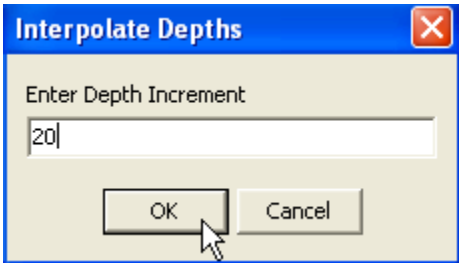


The Confirm Interpolate Depths? message is displayed.

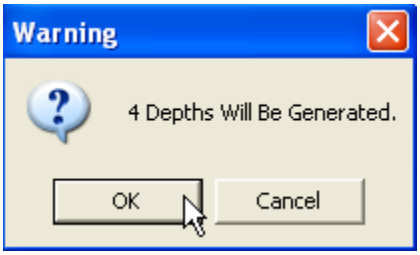

Interpolate Depths?
This function will automatically interploate depth picks between the uppermost and lowermost depths. You will enter interpolation increment.
OK
Cancel

11. Click **OK** to continue.

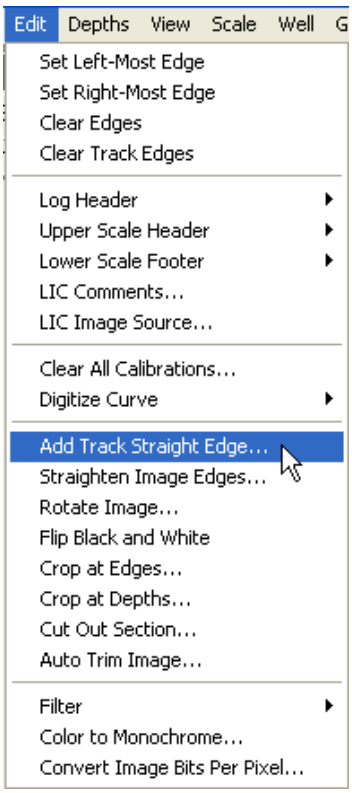
12. Enter 20 in the **Interpolate Depths** dialog screen.



13. Click **OK,** and then click **OK** on the ***Confirm Warning 4 Depths Will Be Generated***. dialog screen.



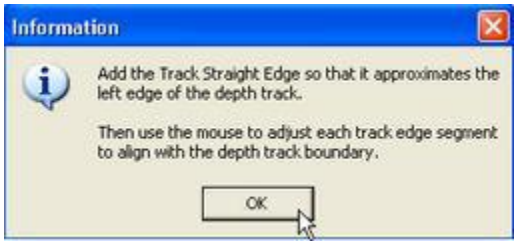
14. Click the **Edit→Add Track Straight Edge…** menu.



OR

the **Add Straight Edge** icon

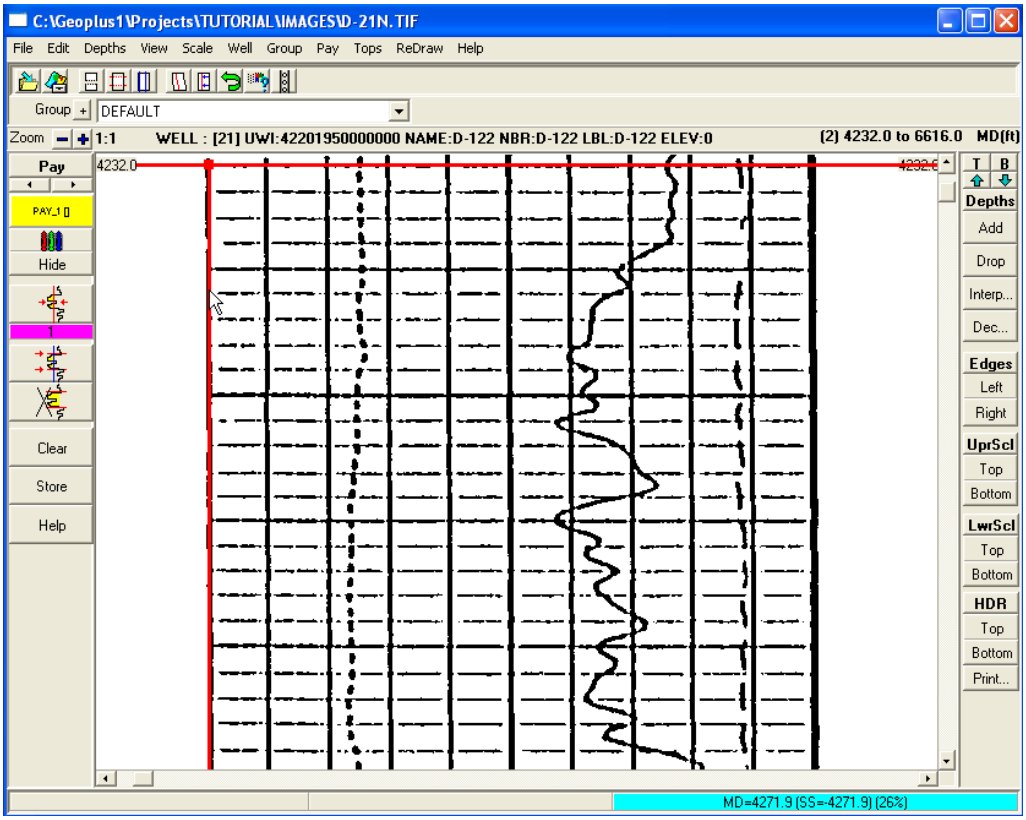
The following Information message is displayed. Click **OK** to continue.


Information
Add the Track Straight Edge so that it approximates the left edge of the depth track.
Then use the mouse to adjust each track edge segment to align with the depth track boundary.
OK

Click **OK** to continue.

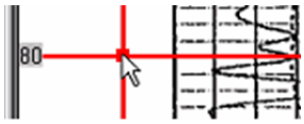
The example image included with the Tutorial project is a fairly straight image; therefore, you do not see the offset of the log calibration control points like the ones shown in the examples below. The examples below have the straight edge positioned at the left edge of the left-most log track. Normally, the left edge of the depth track is used as the depth track is generally the straightest.

These two examples show the adjustment that must be made to straighten the image. As you view the image at deeper depths, you see varying amounts of adjustment that need to be applied to the image.



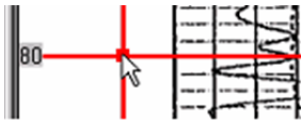
In this example, with depth, the straight edge is farther away from the edge of the image.

Adjust each depth calibration control point to align with the edge of the of the log curve track.



The following example shows the depth calibration control point after it has been moved to the edge of the log curve track.

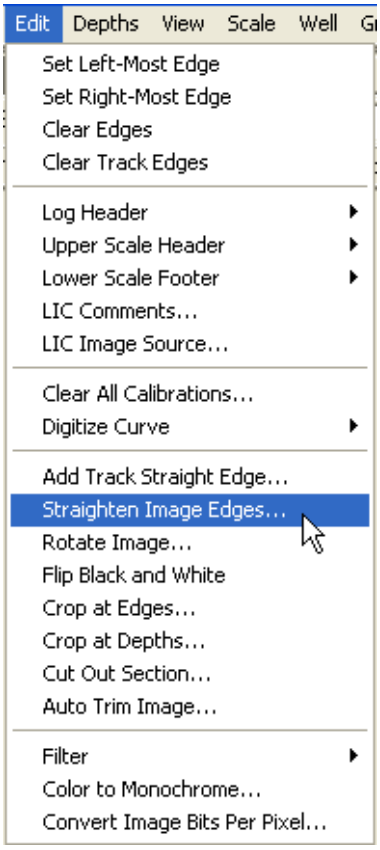
You can see from these examples that some control points require more adjustment than others. Add more control points and adjust, if necessary.



You can zoom to a larger scale and fine-tune the control point adjustment. In the example shown below, you move the control point slightly to the right.

Continue, with the following:

1. Click the **Edit→Straighten Image Edges…** menu option

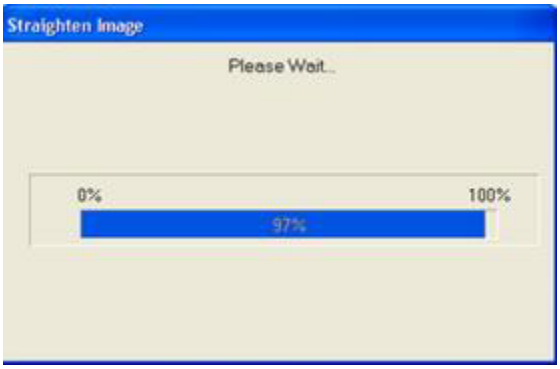


OR

the **Straighten Image** icon.

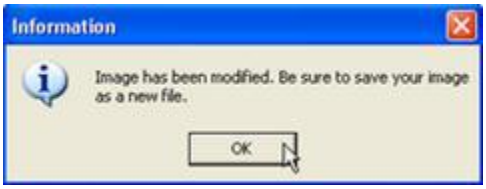
2. After clicking the **OK** button on the ***Confirm*** dialog screen, when you scroll down the image, you see that the image has been straightened.

The message shown below is displayed during the straightening of the image.



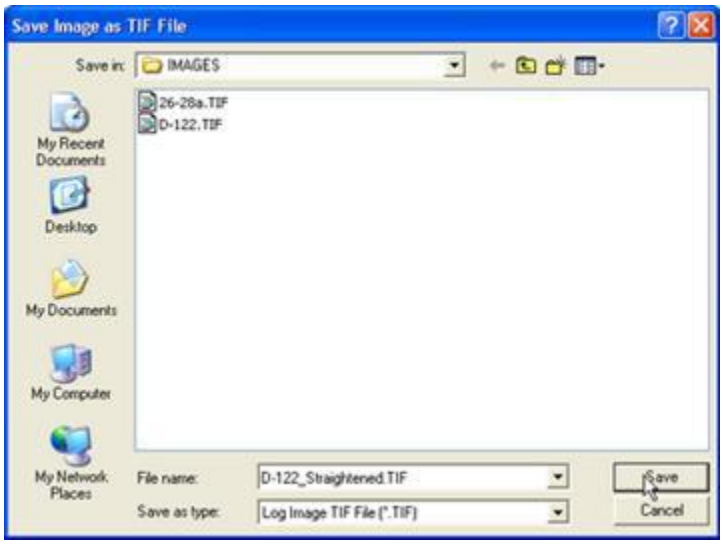
You see an Information message displayed telling you that the image has been modified with a reminder to save the image to a new file name.

3. Click **OK** to continue.



4. Click the **File→Save Image As…** menu to save the image to a new name.

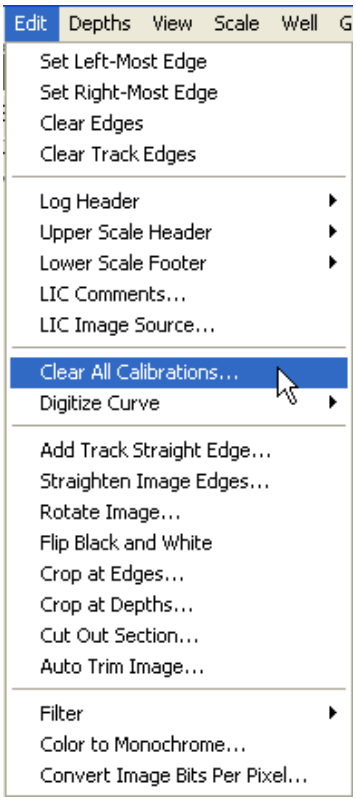
A ***Save Image as TIF File*** dialog screen is displayed.



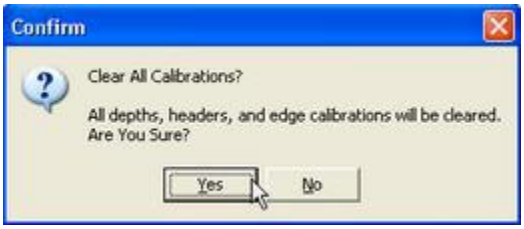
5. Enter the new file name for the image. For the example, use **D-122_Straightened.tif** as the file name.
6. After entering the name for the straightened image, click **Save**.

The dummy calibrations, used for straightening the image, need to be cleared out of memory.

1. Click the **Edit →Clear All Calibrations...** menu.



The following confirmation dialog screen is displayed.



2. Click **Yes**.

   The dummy calibrations are cleared from memory.

   You are now ready to calibrate the image.

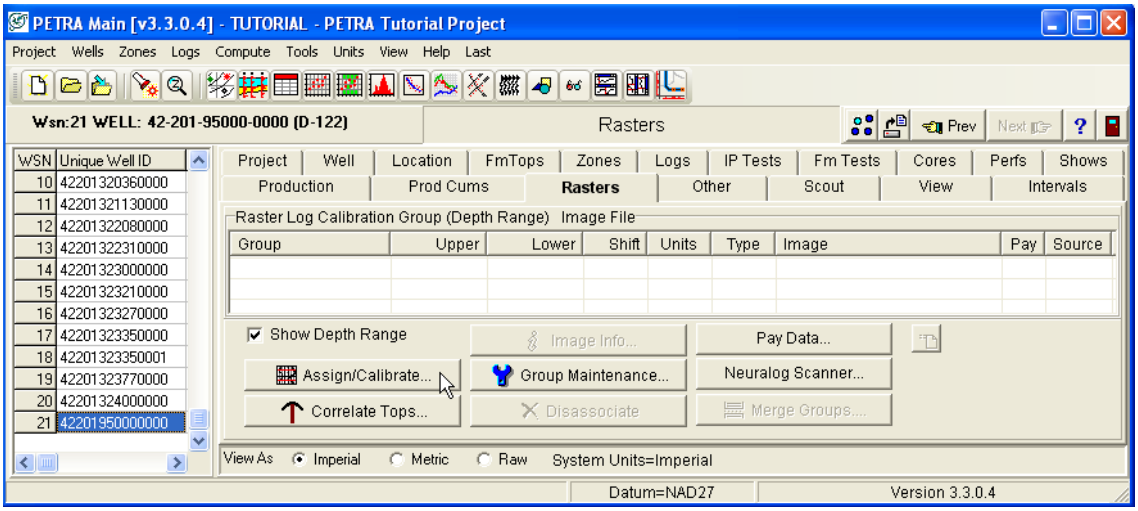
Depth Calibration – Log Image

If you are not in the Calibrate Log Image module, from the cross section you can bring up the calibration module by clicking the **RasterLogs →Log Image Calibration…** menu

Optionally, you may right click the well that you want to assign the image to, and then click the **Calibrate Log Image…** option.

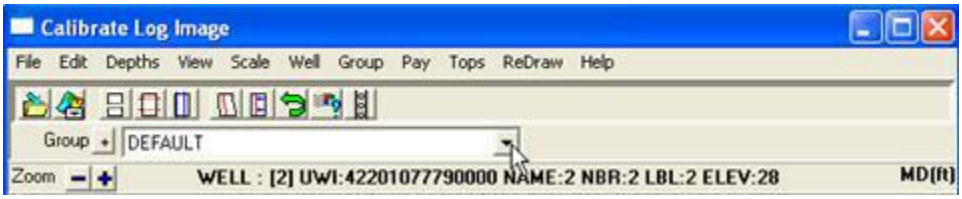
Calibrate Log Image...
Redraw
Well Info
User Favorites
User Favorite Strat Intervals
User Favorite Structure Intervals
Set Raster Template For This Well Only...
Enable Raster Template For This Well...
Disable Raster Template For This Well...
Show Raster Image Details...
Set Log Curve Scales...
Convert Real Well To Pseudo Well...
Log Type For This Well
Drop Well From Section...

From the Main module, you can bring up the calibration module by clicking the well, in our case, **WSN 21**, the **Raster** tab, and then the **Assign/Calibrate** button.

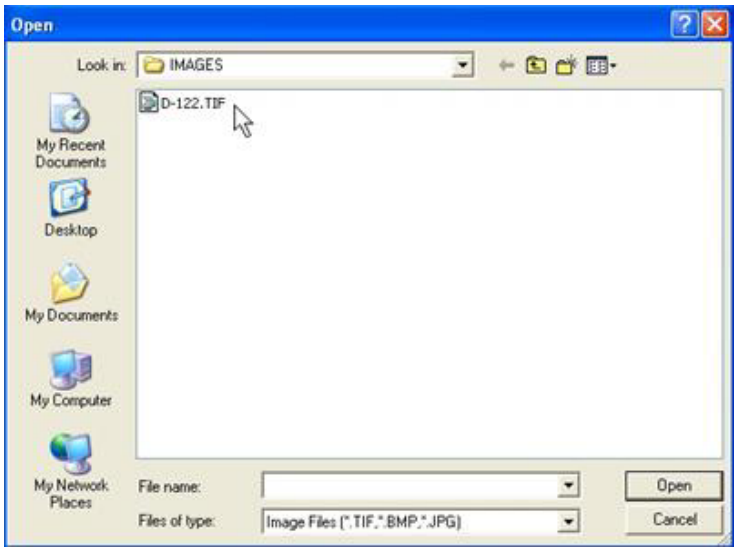


Once you get to the Calibrate Log Image dialog screen, either from the Main module or from the Cross Section module, the calibration procedure is the same:

When the ***Calibrate Log Image dialog*** screen is displayed, you see a series of drop-down menus across the top, the DEFAULT image group name, and the well that has been selected prior to coming into the Calibrate Log Image dialog screen.



1. Load the image into the **Calibrate Log Image** dialog screen by clicking the **File→Open Image…** menu.



2. Click the **D-122.tif** image, and then click the **Open** button.
3. After the image is loaded, click the **Zoom - +** buttons, as needed, to see a reasonable amount of the image.

Image Groups

The cross-section displays log images for a given well by referencing group names. For example, you might display images from the GR group in track 1 and images from the Default group in track 2.

PETRA predefines one group called the Default group. An image can be calibrated using this group name; however it cannot be deleted or replaced. You can create as many additional groups as you have different log types in a project. Group names should normally have something to do with either the log curves they contain or the sample rate (number of inches per 100 feet) of the log, that is, 5-inch logs.

Each well can have only one image or vertical slice of an image in a group. However, there is no limit to the number of different groups you can define. Therefore, if you have five different log images for a well, you must have five different image groups defined. The well has 1 image in each of the five groups.

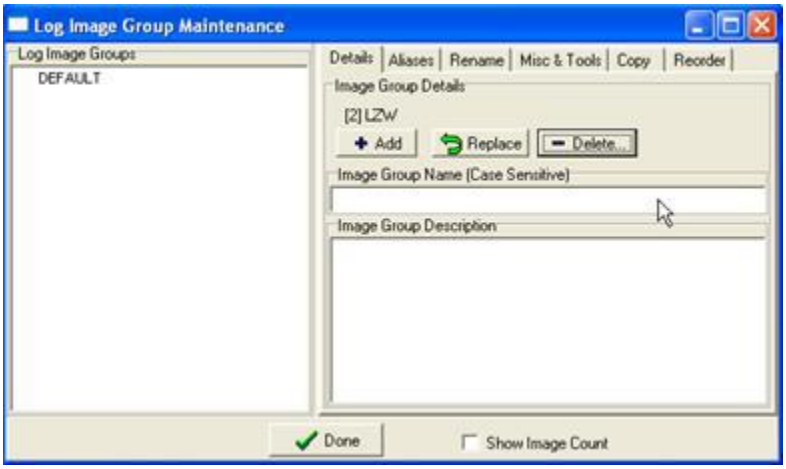
The PETRA database has a table containing a reference to log image calibrations. Each record in the table contains a well sequence number (WSN), image group number (IGN), and a path to the calibration file. This scheme allows an unlimited number of images to be referenced for any given well.

To add a new group,

1. Click the **Group** menu item.

   The Add or Delete Groups… menu option is displayed.

   When you click the **Add or Delete Groups…** menu option, a Log Image Group Maintenance dialog screen is displayed.



2. Enter a new Group name in the *Image Group Name* (Case Sensitive) data field and enter a description for the new group in the *Image Group Description* data field.

3. Click the **Add** button with the blue plus

to add the new group to the Log Image Groups section.

Another way to add a new group is to

1. Click the small **plus +** button to the right of Group at the top of the calibration screen.

   A ***New Image Group Name*** dialog screen is displayed with an *Enter New Group Name* data field.

2. Enter the new Group name, and then click the **OK** button.

   You see the new group name when you click the drop-down selection button to the right of the Group data display field.

The log images for different log types can be saved as a different group. For instance, you might want to call the 5 inch gamma ray GR_5IN. Other examples are: NeutronDensity_2_5IN, Resistivity_1IN, Elog, and so forth.

Calibrating a Log Image

The Depths calibration menu has the following options:

- Image Depth Type - Remember to set the type to TVD for TVD images. The default is MD.
- Image Depth Units Are
- Display Depths As
- Go To Depth... (Ctrl+g function keys)
- Go to First Calibrated Depth
- Go to Last Calibrated Depth
- Restore Original Depths...
- Add Depth Point
- Delete Depth
- Delete All Depths...
- Interpolate Depths...
- Set Est. Depth Rounding Factor...
- Set Depth Pick Tolerance
- Set Depth Shift Amount...

The Image Calibration Toolbar

The following sections describe the features and uses of the Image Calibration toolbar.

The Depth Calibration toolbar

The Depth Calibration toolbar is located on the right side of the ***Calibration*** dialog screen and has several parts to it.

The Go To Top Depth and Go To Bottom Depth buttons

are at the top of the toolbar. When you click the T button

, the image is displayed at the first calibration depth. When you click the B

button, the image is displayed at the last calibration depth.

The Previous Depth button, function key F7, and Next Depth button, function key F8 buttons are next. When you click the **Previous Depth** button or the function key **F7**, the image is displayed at the previous calibration depth. When you click the **Next Depth** button or the function key **F8**, the image is displayed at the next calibration depth.

The Depths section

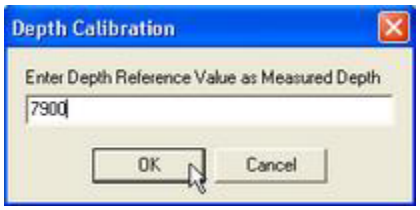
The Depths section is next and contains the Add, Drop, Interp... and Dec... buttons.

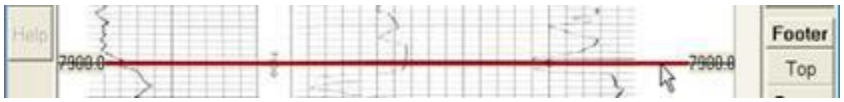
1. When you click the **Add** depth button

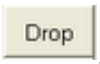
, a horizontal blue line is displayed when the cursor is placed on the image.
2. Move the blue line to a depth on the image, and then left click to anchor the line at that depth.

   A Depth Calibration dialog screen is displayed.
3. Enter the depth value the blue line represents, and then click **OK**.

   The line turns red, and the depth entered is displayed on the image.



4. 

5. When you click the **Delete Depth Drop** button 

, move the cursor to a calibration depth line to select it.

   When it is selected and you left click the calibration line, the calibration depth is deleted.

The Interpolation button

The Interpolation button

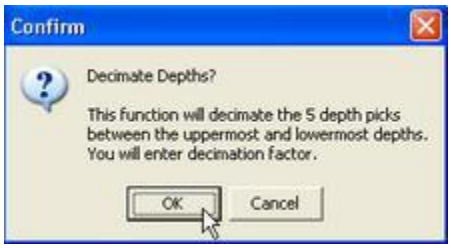
is used to interpolate depths between the uppermost and lowermost depths. You enter the interpolation increment.

The Decimate Depths button

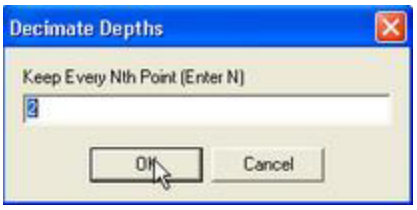
The Decimate Depths button

is used to decimate the calibration depths.

1. When you click the Decimate Depths button, a ***Confirm*** dialog screen is displayed. If you want to proceed, click **OK**.


Confirm
Decimate Depths?
This function will decimate the 5 depth picks between the uppermost and lowermost depths. You will enter decimation factor.
OK
Cancel

2. Enter a number for the decimation, and then click **OK**.



The results of the decimation are displayed.

3. Click **OK** to complete the transaction. Remember to save your calibration file.

The Edges section

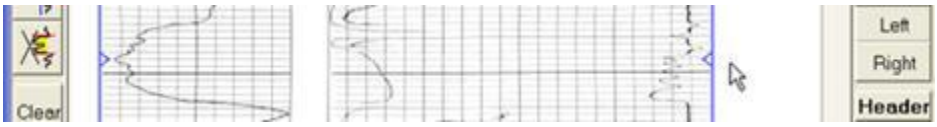
The Edges section is next and contains the Left and Right buttons.

When you click the **Set Left-most Edges** button

, a vertical blue line is displayed when the cursor is placed on the image. Move the blue line to the left edge of the image and left click to anchor the line at that edge. The line changes to a thin blue line with an indicator pointing to the right of the image.

When you click the **Set Right-most Edges** button

, a vertical blue line is displayed when the cursor is placed on the image. You move the blue line to the right edge of the image and left click to anchor the line at that edge. The line changes to a thin blue line with an indicator pointing to the left of the image.



The Upper Scale Block section (titled UprScl on the button)

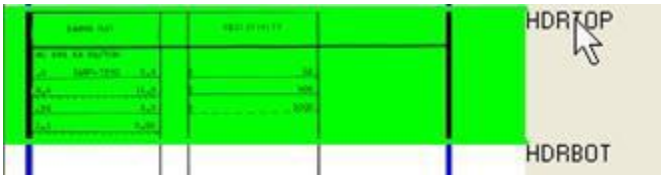
The Upper Scale section is next and contains the Set Header Top and Set Header Bottom buttons.

When you click the **Set Header Top Scale** button

, a horizontal blue line is displayed when the cursor is placed on the image. You move the blue line to the top of the header on the image and left click to anchor the line at that point. The line turns green and the keyword HDRTOP is displayed to the right of the image.

When you click the **Set Header Bottom Scale** button

, a horizontal blue line is displayed when the cursor is placed on the image. You move the blue line to the bottom of the header on the image, and then left click to anchor the line at that point. The line turns green, and the keyword HDRBOT is displayed to the right of the image and the calibrated header section is set to a green color fill.



The Lower Scale Block section (titled LwrScl on the button)

The Lower Scale section is next and contains the Set Header Top and Set Header Bottom buttons.

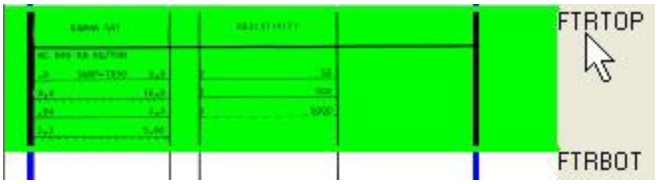
When you click the **Set Header Top Scale** button

, a horizontal blue line is displayed when the cursor is placed on the image. You move the blue line to the top of the footer on the image and left click to anchor the line at that point. The line turns green and the keyword FTRTOP is displayed to the right of the image.

When you click the **Set Header Bottom Scale** button

, a horizontal blue line is displayed when the cursor is placed on the image. You move the blue line to the bottom of the footer on the image and left click to anchor the line at that point. The line turns green and the keyword FTRBOT is displayed to the right of the image and the calibrated footer section is set to a green color fill.

Since this image does not have an Upper and a Lower Scale, this display shows the same section of the image as the Upper Scale Block.



The Log Header section (titled HDR) on the button

The Log Header section is next and contains the Set Log Header Top, Set Log Header Bottom, and Print Log Header Print… buttons.

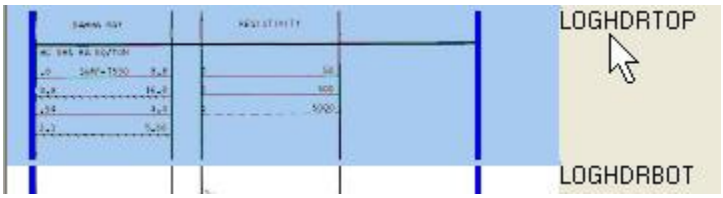
When you click the **Set Log Header Top** button

, a horizontal black line is displayed when the cursor is placed on the image. You move the black line to the top of the Header on the image and left click to anchor the line at that point. The line turns blue and the keyword LOGHDRTOP is displayed to the right of the image.

When you click the **Set Log Header Bottom** button

, a horizontal black line is displayed when the cursor is placed on the image. You move the black line to the bottom of the footer on the image and left click to anchor the line at that point. The line turns green and the keyword LOGHDRBOT is displayed to the right of the image and the calibrated header section is set to a blue color fill.

Since this image does not have a Header, this display shows the same section of the image as the Upper and Lower Scale displays.



Click the **Print** button

to select a printer/plotter to print the WSN, UWI, Name, Image Group, calibration file and image file information and the Header of the image.

Assign a Group Name

Select the appropriate image group from the **Image Group Name** drop-down list or Add a new group using the **Group→Add or Delete Groups...** menu. Refer to the Image groups section above for more detailed information. For the purposes of this tutorial, use the Default group.

Define the Calibration Depths

This process involves picking two or more depths from the image. Each depth point is picked by first choosing the **Edit→Add Depth Point** menu or by clicking the **Add** button Add located at the top of the Calibration toolbar.

1. Position the horizontal cursor exactly at the depth you wish to pick, and then click the left mouse button.

   You are prompted for the depth value.

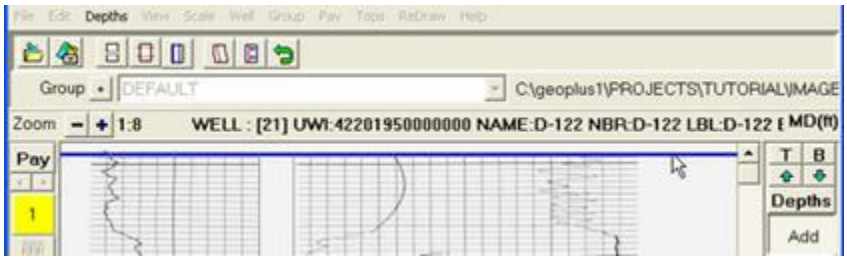
2. Enter the depth value.

   The screen redraws showing you the new calibration depth point.

3. Repeat the process for each depth reference point.

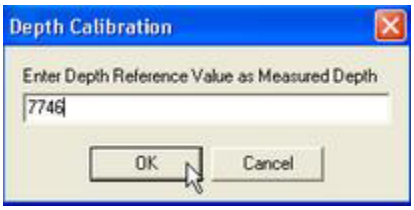
4. When all of the depths have been entered, you can click with the right mouse button, or click the **Add** Add button to get out of the Add Depth Point mode.

5. Position the horizontal blue line at the top depth line, and then click the left mouse button.

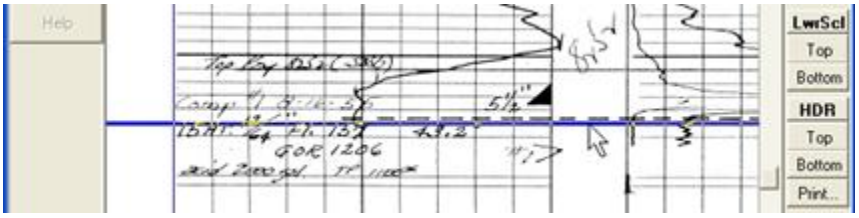


   A ***Depth Calibration*** dialog screen is displayed.

6. Enter the depth that the blue line was dropped on. For the tutorial, it is **7746**, and then click **OK**.

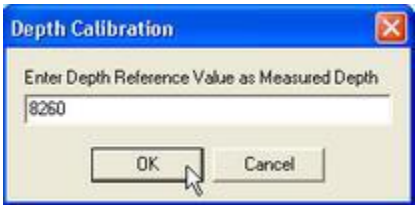


7. Scroll to the bottom of the image, and then left click after positioning the blue line on the desired depth.



In this case the depth is **8260**.

8. Click **OK**.

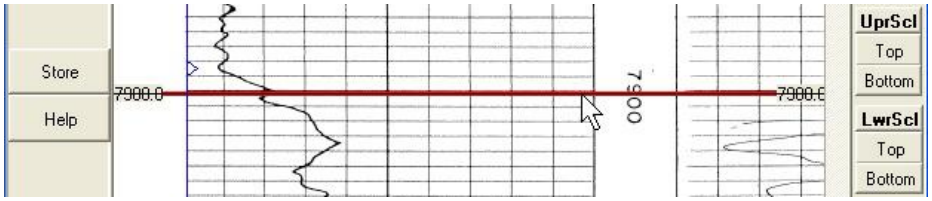


9. Scroll back up through the image to look at the depth indicator lines at the 100 foot depths on the image. They are narrow black lines that appear every 100 feet.
10. If the depth indicator is shifted above or below where it should be, left click the blue line at the correct depth.

    The Depth Calibration dialog screen is displayed with the depth where the line was positioned.
11. Click **OK**.
12. Scroll up and down to see if there are any more depth indicator lines that are offset.
13. Add a Depth Calibration line for the ones that are offset. You may only have to add one. Sometimes several are required.
14. When the depth calibration process is completed, right click to end the calibration process or click the **Add** button

to turn off the calibration process. Below is the 7900 foot

marker that is slightly offset.

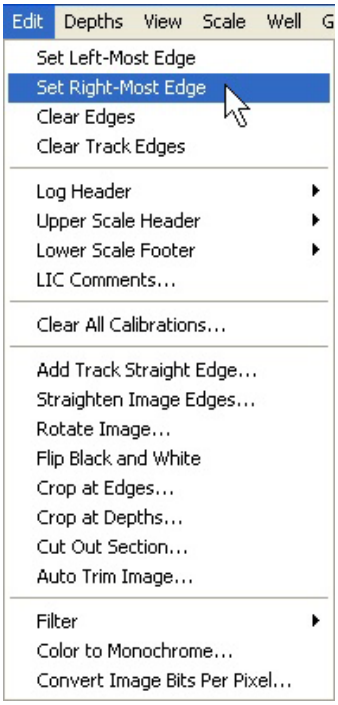


Note: The portion of the image that can be displayed on the cross-section is only the section within the range of the calibration depths. Portions of the image above the shallowest calibrated depth and below the deepest calibrated depth are not displayed, except for the header and the footer.

Note: If you need to adjust the location of the depth calibrations, click and drag the depth marker using the left mouse button.

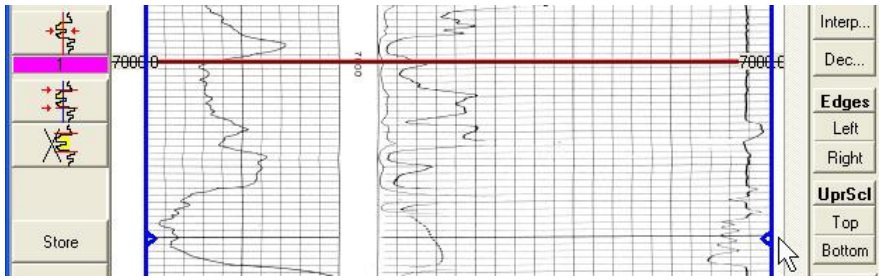
Define the Left and Right Edges of the Image

Set the leftmost edges of the image to display by using the **Edit→Set Left-Most Edge** menu



or by clicking the **Left** button Left under the Edges portion of the Image Calibration toolbar.

1. Position the vertical cursor at the leftmost point of the image to trim the left edge.
2. Set the right-most edges of the image to display by using the **Edit→Set Right-Most Edge** menu or by clicking the **Right** button Right under the Edges portion of the Image Calibration toolbar.
3. Position the vertical cursor at the right most point of the image to trim the right edge. Shown is an example of the left and right edges with the edge indicator pointing in from each edge.

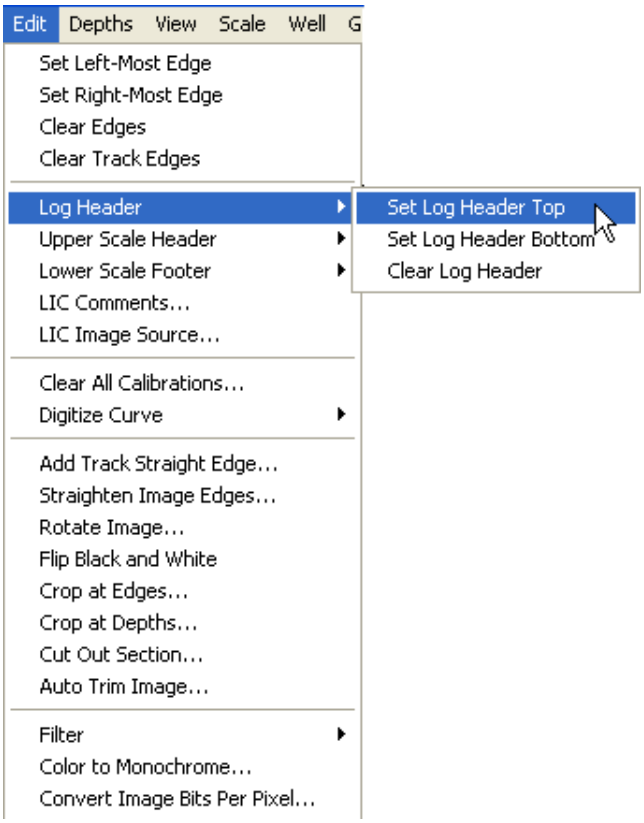


Note: To adjust the location of either edge marker, click and drag the marker using the left mouse button.

Define the Log Header Section

For this example,

1. Click the **Edit→Log Header→Set Log Header Top** menu.



OR

click the **Top** header button in the HDR section.

A horizontal black line is displayed when the cursor is placed on the image.

2. Move the black line to the top of the header on the image and left click to anchor the line at that point.

   The line turns blue, and the keyword LOGHDRTOP is displayed to the right of the image. The header section normally is the area of the image containing the header information for the well.

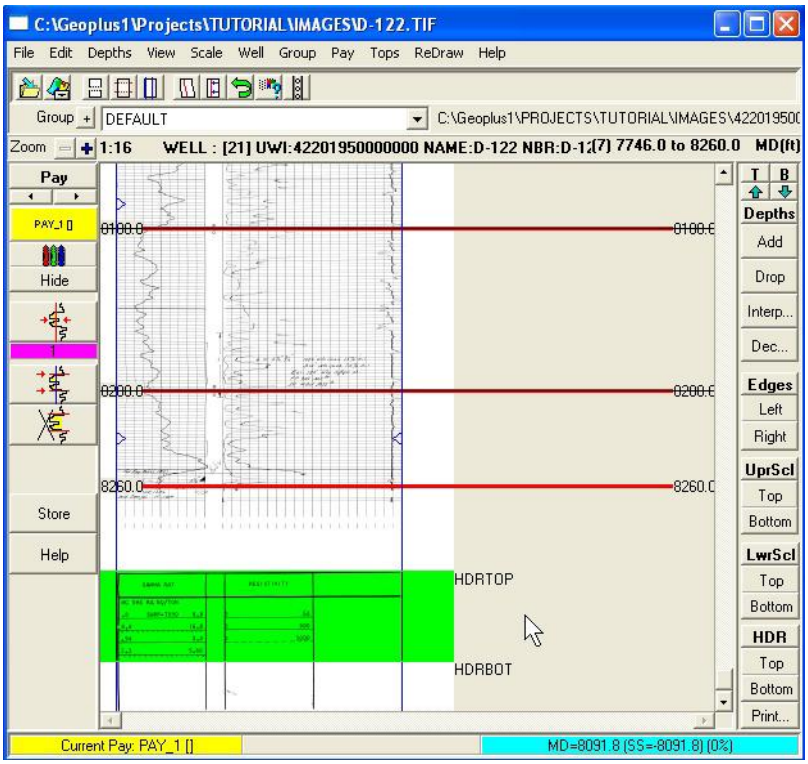
3. Click the **Edit→Log Header→Set Header Bottom** menu or click the **Bottom** header button in the HDR section.

   A horizontal black line is displayed when the cursor is placed on the image.

4. Move the black line to the bottom of the header on the image, and then left click to anchor the line at that point.

The line turns blue, and the keyword HDRBOT is displayed to the right of the image.

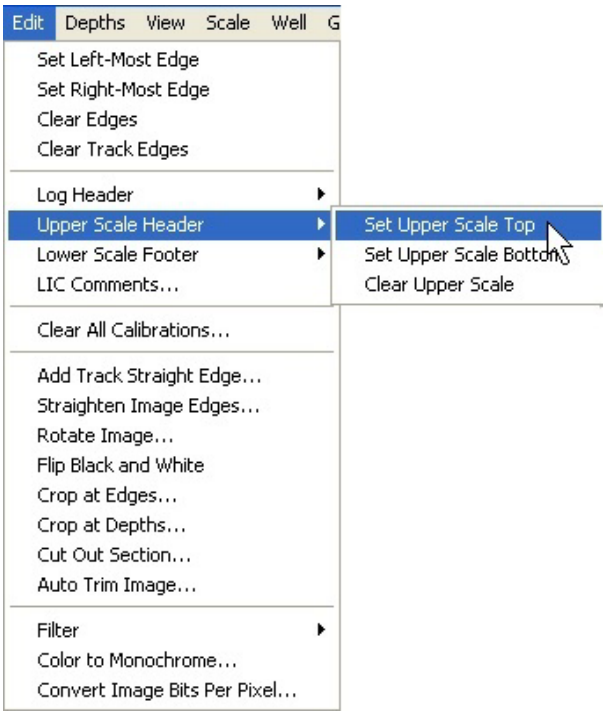
5. To change the location of either header marker, click and drag the marker using the left mouse button.



Define the Log Scale Section

For the tutorial example, use the Header portion of the image as the Footer since there is not a separate header and footer for this image.

1. Click the **Edit→Upper Scale Header→Set Upper Scale Top** menu.



OR

click the Set Header **Top** footer button .in the Upper Scale section titles UprScl.

A horizontal blue line is displayed when the cursor is placed on the image.

2. Move the blue line to the top of the scale section on the image and left click to anchor the line at that point.

   The line turns green, and the keyword HDRTOP is displayed to the right of the image. The scale section normally is the area of the image containing the log track scales.

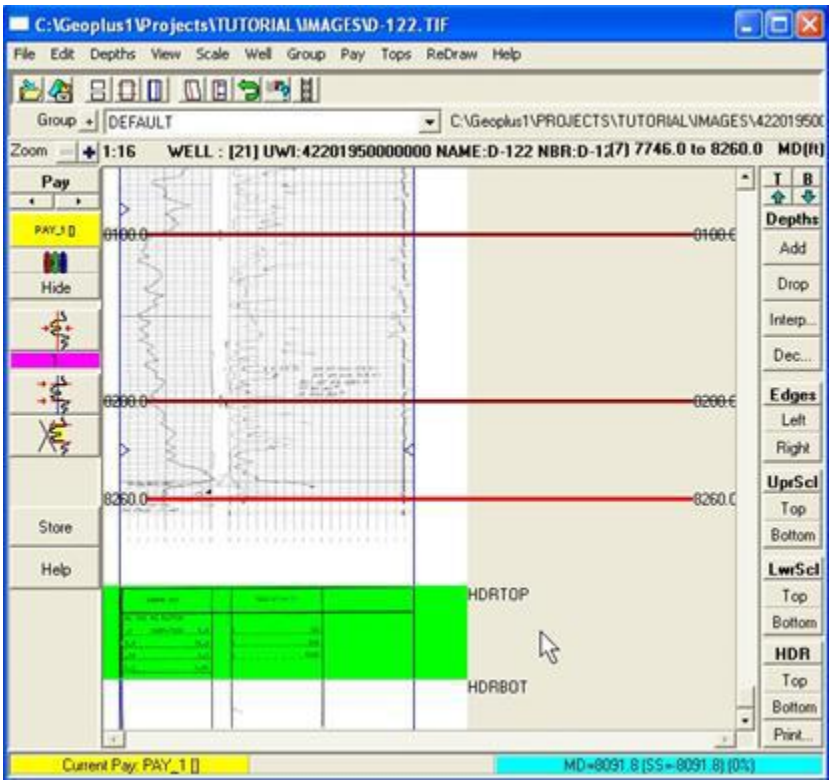
3. Click the **Edit→Upper Scale Header→Set Upper Scale Bottom** menu or click the Bottom footer button in the Upper Scale section titles UprScl.

   A horizontal blue line is displayed when the cursor is placed on the image.

4. Move the blue line to the bottom of the footer on the image and left click to anchor the line at that point.

   The line turns green, and the keyword HDRBOT is displayed to the right of the image.

5. To change the location of either footer marker, click and drag the marker using the left mouse button.



6. Follow the same procedures to calibrate the Lower Scale section for an image using the Lower Scale Block titled LwrScl and the associated buttons or menu.

Deleting Calibration Depths

Individual depth references can be deleted using the **Depths→Delete Depth** menu

or clicking the **Drop** button located in the Depths section of the Calibration toolbar. After invoking the delete function, click the left mouse button on the depth marker to be deleted. The screen redraws once the marker is deleted.

You can also delete all depth references using the Menu Option **Depth→Delete All Depths....**

Saving the Calibration File

To save the Calibration file,

1. Choose the **File→Save Calibration As...** menu to save a file containing the calibration data, image name, depth references, etcetera.

   This also updates the PETRA database with a reference to the calibration file, which is now associated with the current well.

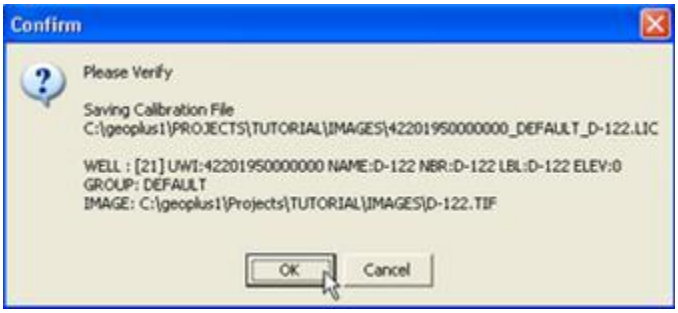
   Note: Log Image Calibration files have a file extension of .LIC.

2. Click the **Save File** button with the green check

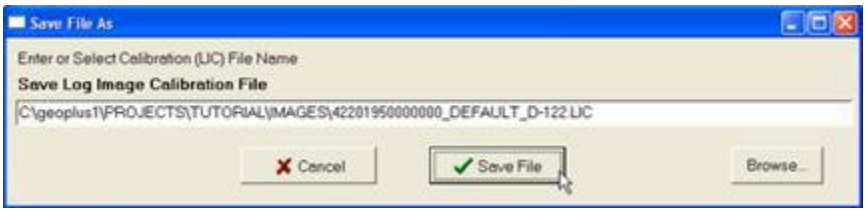
to save to the default file name.

   You can change the name to another name. It is suggested that you keep the UWI/API as part of the file name.

3. Click **OK** to confirm the information associated with the calibration file.



4. Click **OK**.



5. To end the calibration session, click the **File→Exit** menu or click the red **X** in the upper right of the dialog screen.

Loading a Calibration File

You can load and modify a previously saved calibration file using two methods.

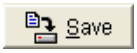
First, the File→Load Calibration File... menu allows you to choose the specific calibration file to be loaded. The image name is read from the calibration file and the image is opened and displayed.

Second, the File→Load Calibration For Group... menu retrieves the name of the calibration file from the PETRA database, which is associated with the current well and image group name.

How to Digitize a Raster Log – TUTORIAL PROJECT

Raster logs are scanned copies of paper logs saved as image files. Digital logs, on the other hand, store log values in a form that is directly readable by a computer. Digital logs have several advantages over raster logs: They are more easily stored in PETRA's database, look great in a cross section, and can be calibrated and used in calculations. Converting a raster log into a digital log is called "digitizing."

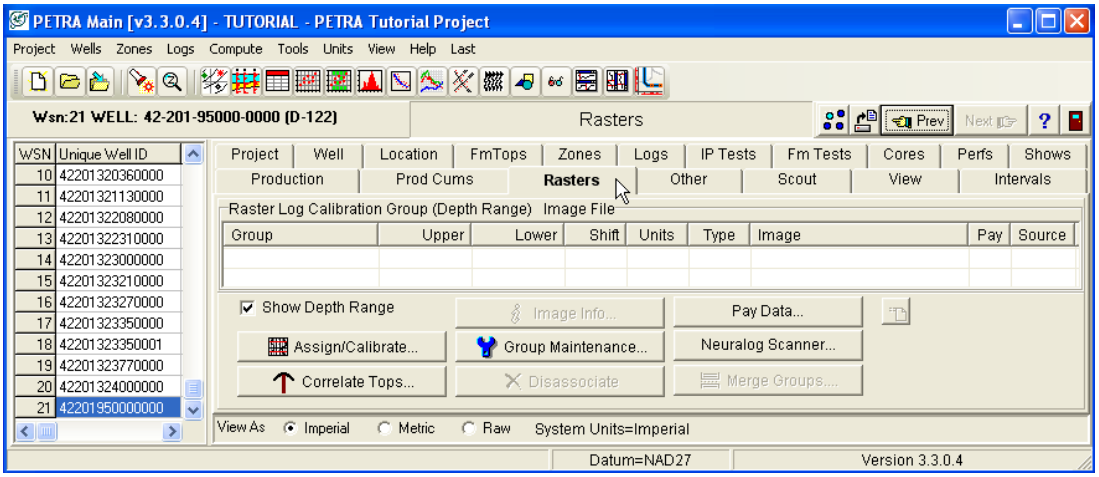
Going from a simple image file to a digital log involves two major steps: depth calibrating the raster image and tracing the desired log curve. This guide walks through depth calibrating and digitizing the GR curve on the D-122 well in the TUTORIAL project.

Note: A value of 16.0 was entered for the ELEV_KB. Click on the Zones tab. Click in the ZValue data field and enter 16.0. Hit enter, and then click on the **Save** button. 

Depth-Calibrating the Raster Image

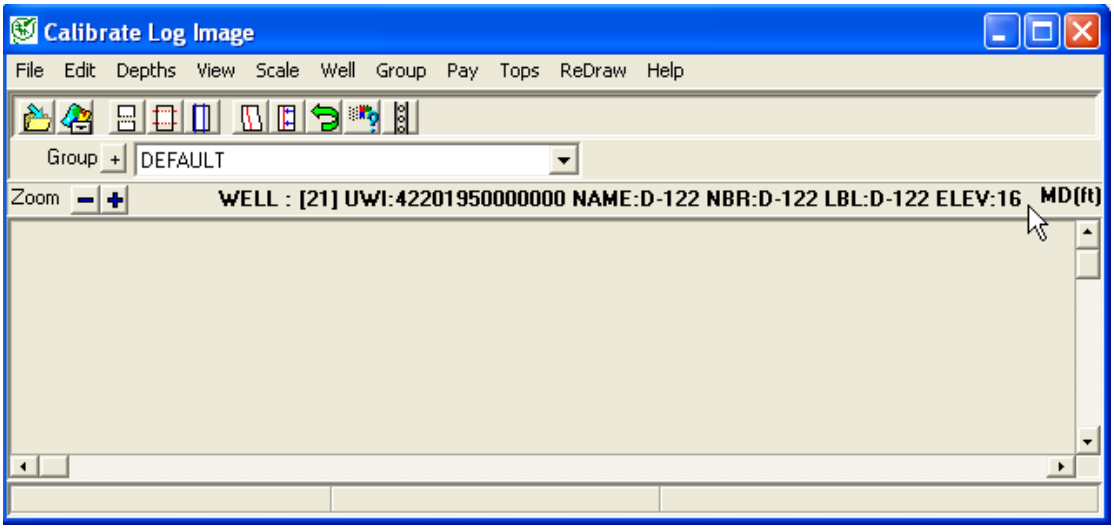
Raster logs are scanned copies of paper logs saved as image files. PETRA needs to know what part of the image corresponds to which depth in order to assign values during digitizing. Most commercial data vendors depth register their data, but images directly from scanners and state providers are not depth calibrated.

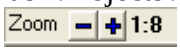
The first step to calibrating a raster is to select the correct well in the Main Module. For this example, select the D-122 well in the Main Module.



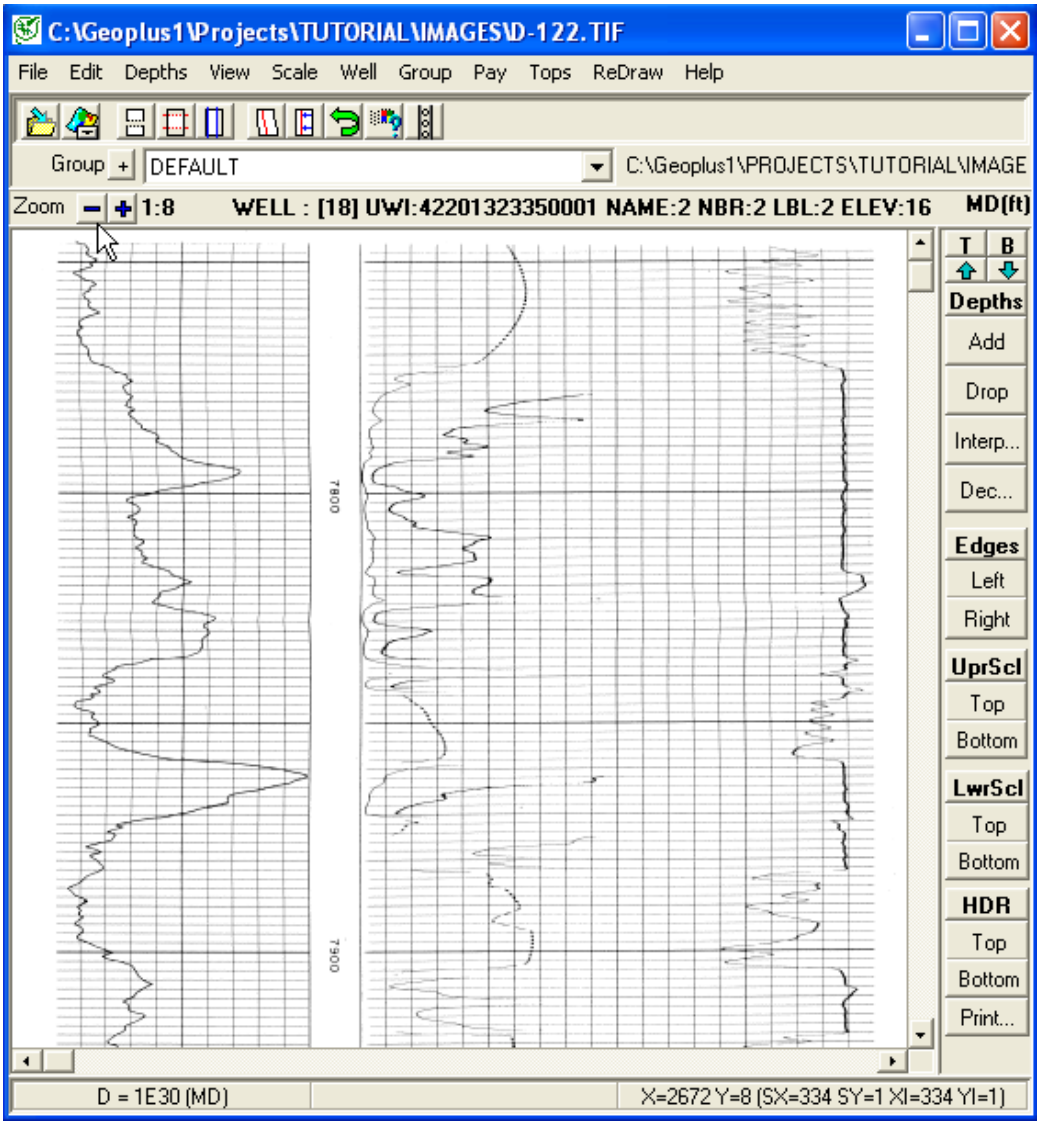
The Raster Calibration Screen

To start calibrating a raster log, open the raster calibration screen. In the Main Module, click on the **Assign/Calibrate** button on the Rasters Tab. This opens the ***Calibrate Log Image*** screen. Notice that the selected well's UWI and name appear on the screen.


Calibrate Log Image
File Edit Depths View Scale Well Group Pay Tops ReDraw Help
Group DEFAULT
Zoom
WELL : [21] UWI:42201950000000 NAME:D-122 NBR:D-122 LBL:D-122 ELEV:16
MD(ft)

Next, open an image file by going to File > Open Image on the menu bar. Navigate to the specific image file and select it. By default, the D-122's raster log will be located here C:\geoplus1\Projects\TUTORIAL\IMAGES\D-122.tif. It might be useful to use the zoom buttons 

on the upper left corner of the window to make the image larger or smaller.



Group Names

All raster images are assigned group names. A group name usually describes the log type (like Resistivity) and/or scaling (1", 2", or 5"of a log image. Select the appropriate image group from the **Image Group Name** drop-down list. To add a new group, click the **plus +** button next to the group names drop-down box or **Group > Add or Delete Groups…** on the menu bar. Since the raster image is a resistivity log, add a Resistivity group.

When selecting or creating group names, it is generally better to aim for fewer, more general group names rather than creating many precise group names. The more group names in a project, the tougher it will be to display cross sections later.

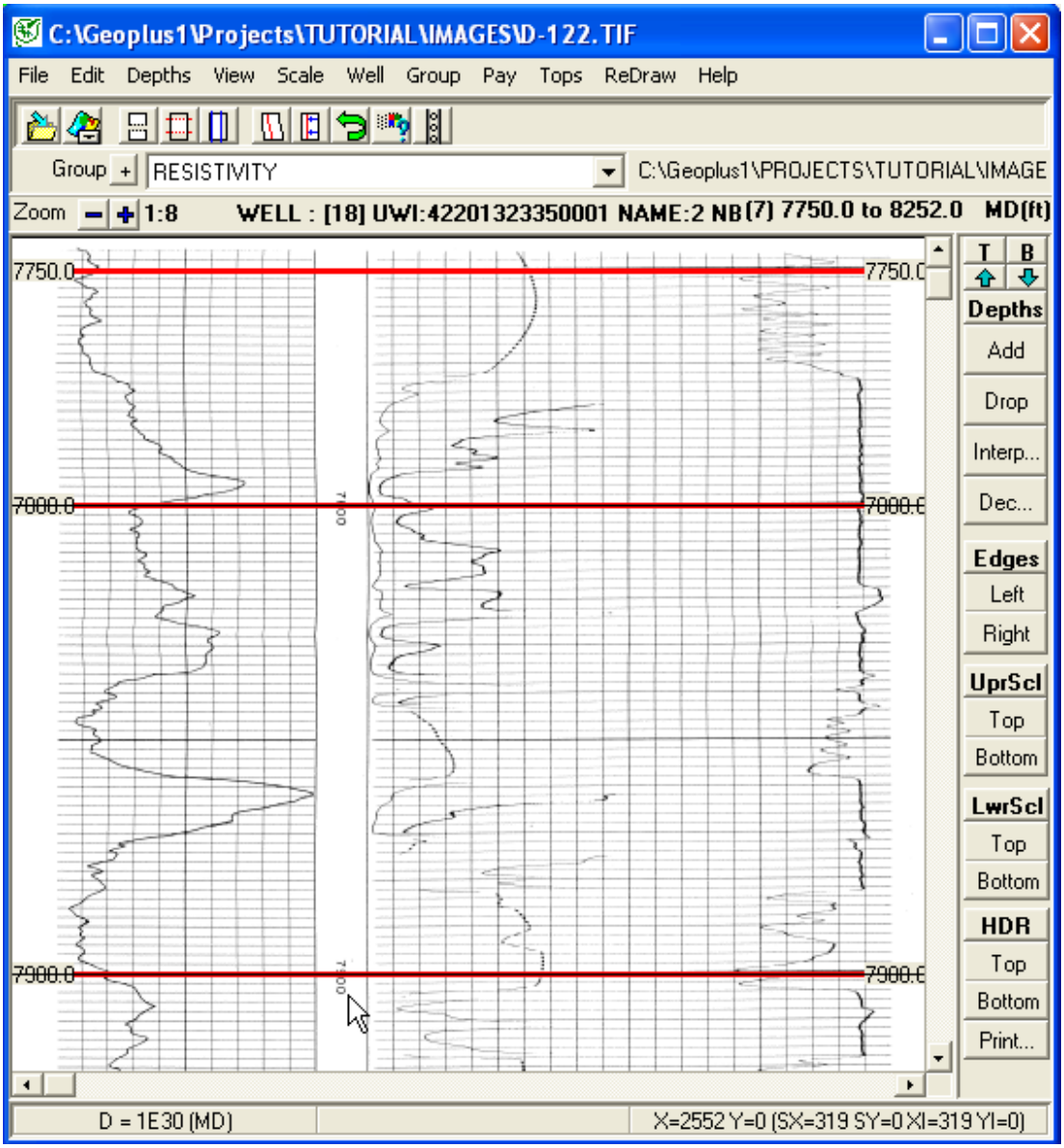
The Depth Calibration Toolbar

Though most of the tools to calibrate logs are available from the menu bat at the top of the screen, the quickest and easiest way to calibrate a raster log is to use the Depth Calibration Toolbar (highlighted in blue in the example above). To turn on this toolbar, go to View > Depth Calibration Toolbar on the menu bar.

Define the Calibration Depths

As mentioned above, PETRA needs computer-recognizable depths to be assigned to depths printed on the log. This process involves picking two or more depth calibration points from the image. Only the log between the top and bottom depth calibration point can be digitized or shown on a cross section.

To create a new calibration depth, click the **Add** button on the Calibration Tool Bar. Alternatively, go to Edit > Add Depth Point on the menu bar. Next, position the horizontal cursor at the depth you wish to pick and click the left nouse button. You will be prompted for the depth value. After entering the depth value, the screen will redraw showing the new calibration depth.



To change the location of the depth, click and drag the depth calibration point using the left mouse button. To edit the value of an existing depth, click the depth calibration point with the right mouse button and enter a new value.

The better the quality of the raster log, the fewer points necessary to depth calibrate the image. Most raster logs only really need a handful of points. PETRA also automatically scales and places reference black lines every 100'. Unlike normal red calibration lines, these cannot be moved—they just show PETRA's scaling between your calibration lines. If these black lines look close to the actual image, your calibration points are sufficient. If the thin black calibration

lines are off of the depths printed on the raster log, add new points or adjust your existing depth calibration points.

Deleting Calibration Depths

To delete an individual depth calibration point, click the **Drop** button on the Calibration Tool Bar. Alternatively, go to the Edit > Delete Depth on the menu bar. After selecting this tool, click the left mouse button on the depth marker to be deleted. The screen will redraw once the marker is deleted.

You can also delete all depth calibration points by going to Edit > Delete All Depth… on the menu bar.

Interpolating Depths

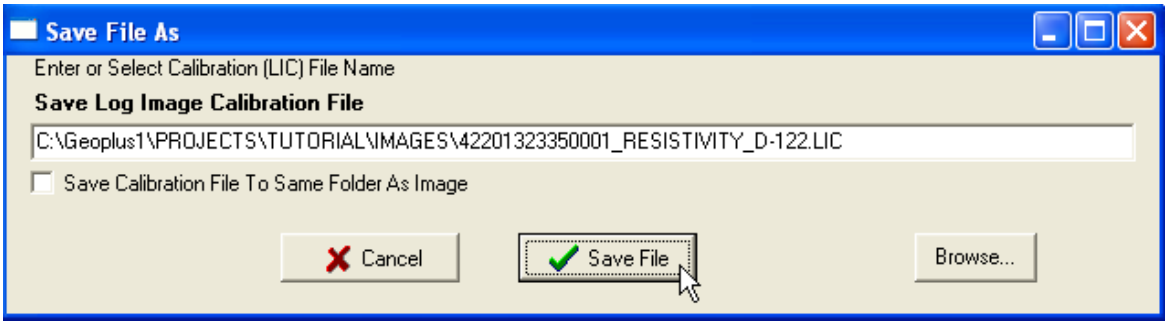
PETRA can interpolate and create calibration depth points between the uppermost and lowermost calibrated depths. Since PETRA already scales between registered depths, adding a lot of new points generally does not aid in the overall calibration of the raster log.

After creating two or more depth calibration points, click the **Interp…** button on the Depth Calibration Toolbar or go to Edit > Interpolate Depths on the menu bar. Select the interpolation increment, and PETRA will compute depths at your specified interval between the top and bottom depth calibration point.

Saving Calibrations

Although it is not strictly necessary for digitizing, this is a good point to save the calibration. A calibration file stores information like depth calibration points and edges, raster image file name, and group name. Saving a calibration file also updates the PETRA database to link the image and group name with the currently selected well.

Click the **Save Calibration As…** button at the top of the screen. Alternatively, go to **File > Save Calibration As…** on the menu bar. This brings up the ***Save File As*** dialog box. It is generally best to use the default name and store the calibration file in the same folder as the image.



After saving the file, the group name will now show up on the Rasters Tab in the Main Module, and you will be able to plot the raster in a cross section.

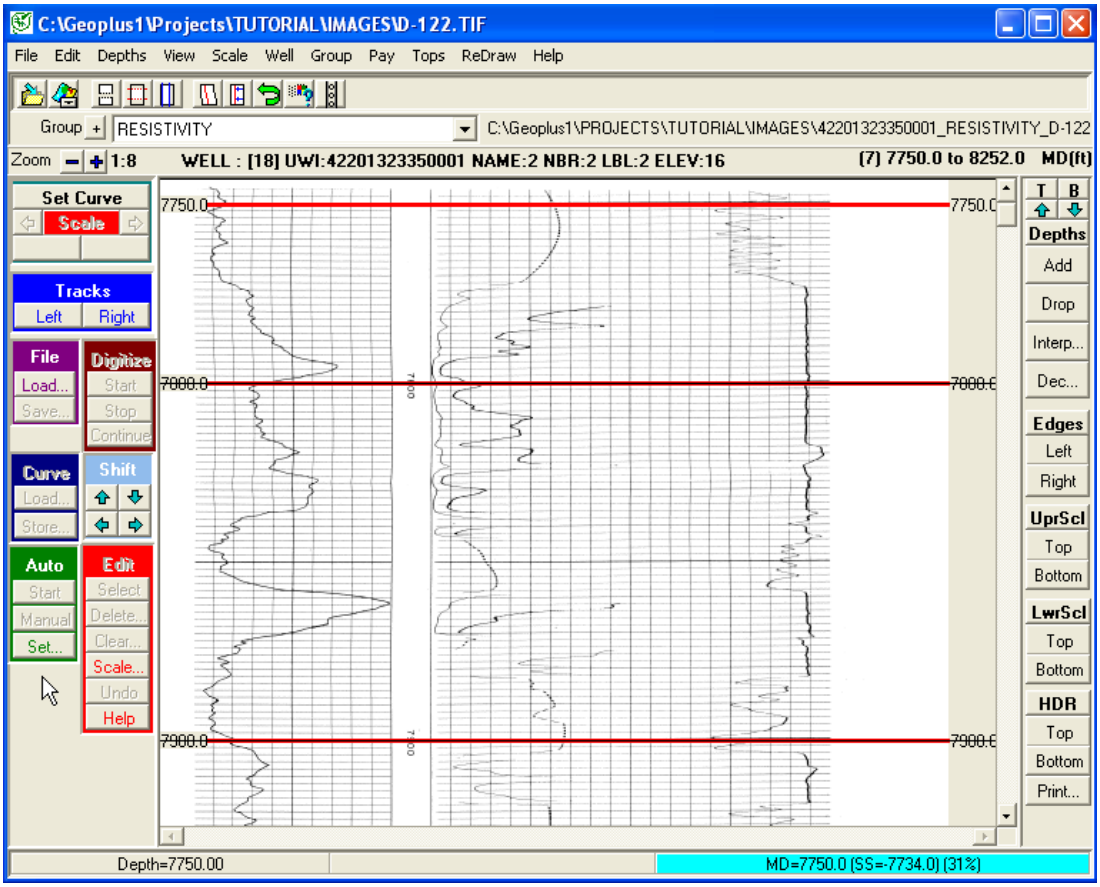
Digitizing the Curve

In the following section, we will cover the following topics to explain digitizing the curve:

- Turning on the curve digitizing toolbar
- Selecting the digital log curve and scale
- Setting the left and right track edge
- Drawing the Digitizing Line
- Changing the Track Scales (Curve Wrapping)
- Editing a Curve Segment
- Saving and Loading Your Work-In-Progress
- Storing a Curve to the Database
- Loading a Curve from the Database
- Starting Another Curve

Turning On the Curve Digitizing Toolbar

Once the raster image is open, select **View>Curve Digitizing Toolbar** on the menu bar at the top of the screen to toggle the toolbar on and off. It will appear on the left side of the screen



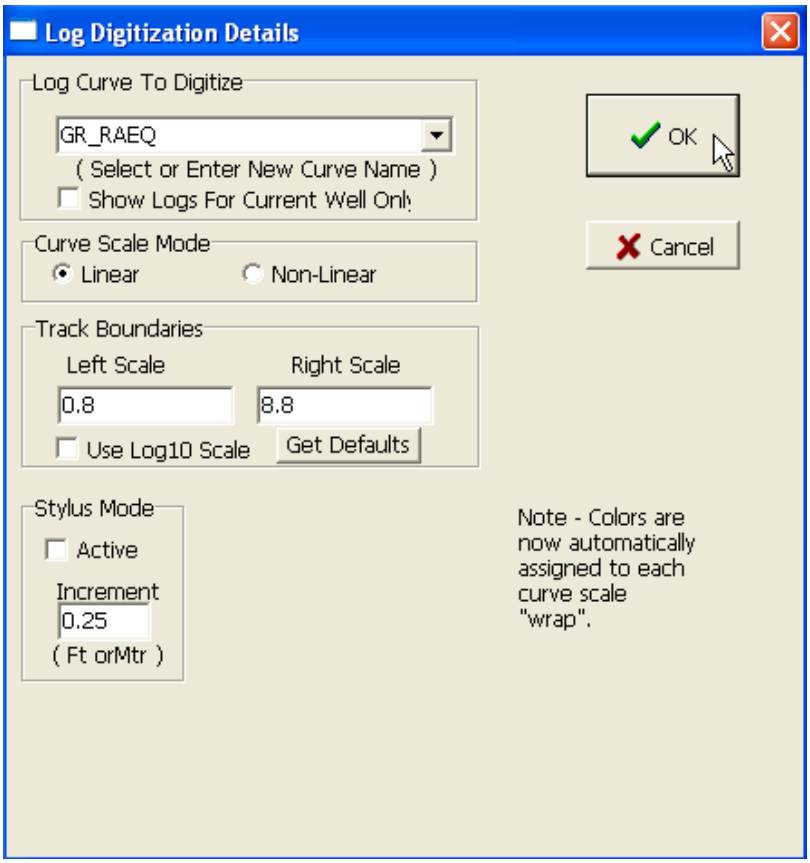
Selecting the Digital Log Curve and Scale

The next step is to tell PETRA the curve name and the scale for the log to digitize. Select the red **Set Curve** button at the top of the digitizing tool bar.

This button opens the ***Log Digitization Details*** window. In the **Log Curve to Digitize** drop-down box, select an existing curve or enter a new curve name. This curve name will be the name of your digital log, so be careful about replacing an existing digital log for the selected well. Next, specify the curve values for the left and right sides of the track boundary. For curves on a logarithmic scale, such as resistivity, make sure to select the **Use Log10 Scale** button.

For this example, we'll digitize the gamma ray curve. Notice that the footer of the D-122 log states that the GR curve has a micrograms radium-equivalent/ton scale from 0.8 to 8.8. In order to distinguish it from a more traditional gamma curve, it is named **GR_RAEQ**. The track

boundaries are set below—just like on the footer, the scales go from 0.8 to 8.8. The actual raster log wraps when the count exceeds 8.8, but that's easy for you to deal with later.



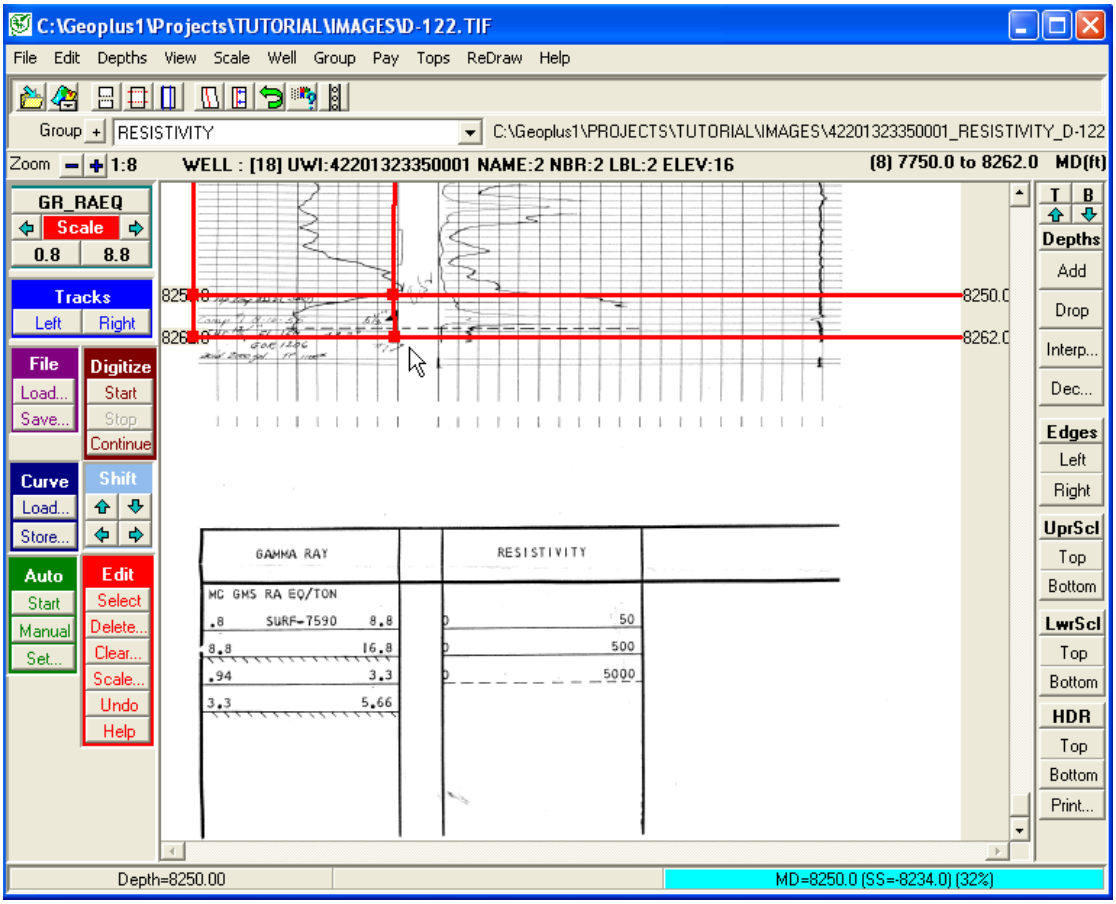
Notice that the same scale box on the digitizing toolbar now shows the name of the curve to be digitized and the scale.

Setting the Left and Right Track Edge

The next step is to set the left and right edges of the track containing the curve to be digitized. PETRA uses these lines to calculate a numerical value of the digital log. Notice that the footer of the log states that the curve's scale is from 0.8 to 8.8. The left and right digitizing track edges will tell PETRA where 0.8 and 8.8 are, with digitized points in the middle scaled accordingly. As an example, a digitized point halfway between the left and right track edges will be stored as 4.8.

To set digitizing tracks, select the **Left** and **Right** buttons in the Tracks box on the digitizing toolbar, and then click the respective track boundary. Remember that digitizing tracks (in the blue box on the left side of the screen) are different than track edges.

In the example below, the left and right track edges (in red) are around the first track containing the gamma ray curve.



Raster logs are often curved due to paper stretching or slipping during scanning. Crooked edges mean inaccurate digital logs. To handle crooked rasters, you can either straighten the whole image, or adjust the left and right track boundaries.

Straightening the whole image has two advantages. You only have to adjust one track straight edge instead of two separate track boundaries, and you can save your work as a new copy of the straightened raster image. If you are digitizing multiple tracks on the same raster log or a fairly long section, straightening the whole image will ultimately save time. For information on how to straighten a raster log, refer to the ***Straightening an Image*** section mentioned earlier in this chapter.

The other way of dealing with crooked raster logs is to adjust the left and right digitizing track lines. Both the left and right track edges have control nodes at every calibration depth. You can move these control points with the left mouse button to align track edges with the image. The advantage to this method is that it saves a step and eliminates the need to store multiple copies of the raster image. Simply adjusting track boundaries is easier for short digitizing runs on straight raster images.

Drawing the Digitizing Line

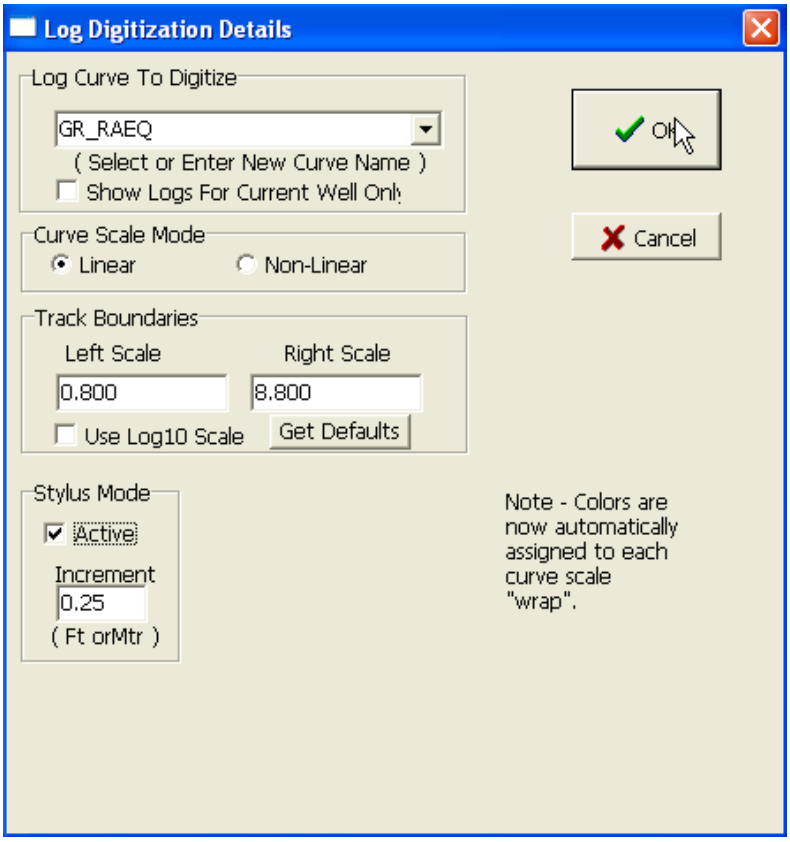
The next step is to actually trace the log curve with a digitizing line. As mentioned above, PETRA reads these lines and compares them to the track boundaries in order to calculate a digital log value for each depth.

There are two major ways to draw these lines: Manual and Automatic.

Drawing the Digitizing Line – Manual

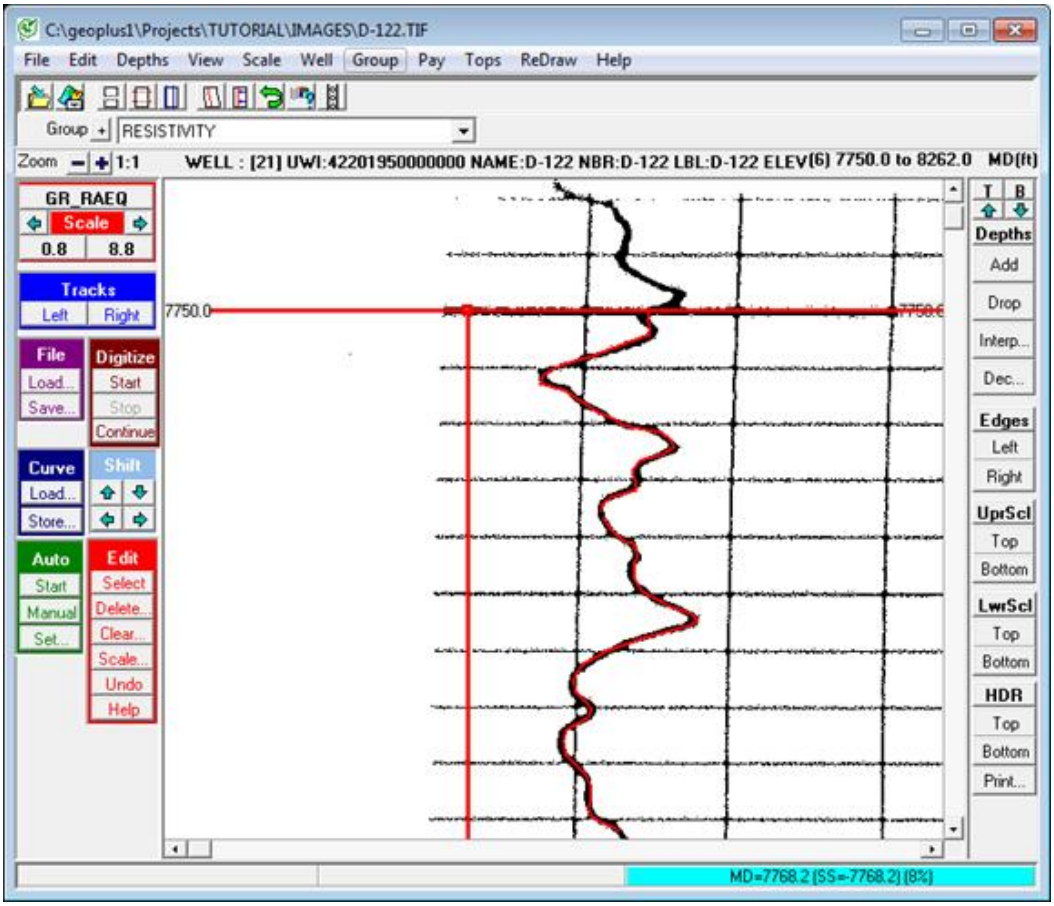
To manually digitize log curves, first click the **Start** button on the Digitize section of the digitizing toolbar.

The Log Digitization Details box will reappear to confirm the settings on the log and scale. Here, you can also select the digitizing style. The default drawing style is that every left click creates one control point on a digitizing line. You can also select **Stylus Mode**, which continually records points at the specified increment when you hold down the left mouse button. In the example below, the stylus mode will create a point every half foot. Select **OK** to keep the log settings and the pick mode and return to the raster image.



The next step is to draw the digitizing line. In stylus mode, click and hold the left mouse button to continually record points. If using point and click mode, simply click on top of the curve to create points and draw a line. If in point and click mode, you can temporarily activate the stylus mode by holding down the ALT key.

Notice that on the bottom of the screen PETRA shows the depth and the value of the curve at the mouse position. These are the values going into the digital log, so it's a good idea to check this in the beginning to make sure the curve and depth values are reasonable.



To stop tracing the digitizing line, click the **Stop** button on the Digitize section of the toolbar or right click the mouse. Digitizing lines are divided into independent segments. Each time you select **Start** during manual digitizing, PETRA brings up the Log Digitization screen and you create a new curve segment with its own scale. Selecting **Continue**, on the other hand, just adds more points to the existing curve segment at the same scale. You can have as many or as few curve segments as you want. For more on curve segments, see ***Editing Curve Segments*** below.

IF YOU MAKE A MISTAKE, you can either immediately stop and fix the mistake or wait until the end. To fix a mistake, you can either individually select and move control points (see ***Editing Curve Segments*** below) or simply select **Continue** and draw over the mistake.

Drawing the Digitizing Line – Automatic

PETRA can also automatically follow and trace simple, bold, well-defined curves.

First, select the **Start** button under the **Auto** section, and then click the uppermost point on the curve to be digitized. The auto tracer will attempt to follow the densest portion of the log beginning at the selected point. You can press the ESC key or click the left mouse button to stop the auto tracer. The **Manual** button allows you to manually re-digitize over sections not properly handled by the auto tracer.

The **Set** button displays a screen for setting properties controlling the auto tracer.

Pick Aperture

When automatically digitizing a curve, PETRA looks for the darkest adjacent point within a window or aperture. The pick aperture sets the size of this window, which is by default 10 pixels wide by 5 pixels tall.

Sample Increment

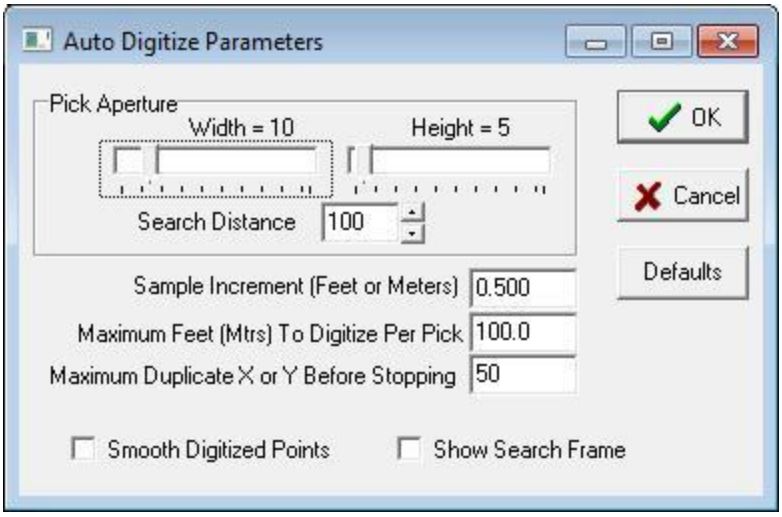
This determines how many nodes will be created for a given foot of log. In the example below, the increment is set for 0.5, so one point will be created at every half foot. Note that this increment just determines how smooth the traced line will be. The sample rate of the digital curve is independent of this number.

Maximum Feet (Mtrs) to Digitize per Pick

This option sets the maximum distance PETRA will digitize a line. Limiting line length prevents PETRA from getting stuck on the wrong line and creating a large mess.

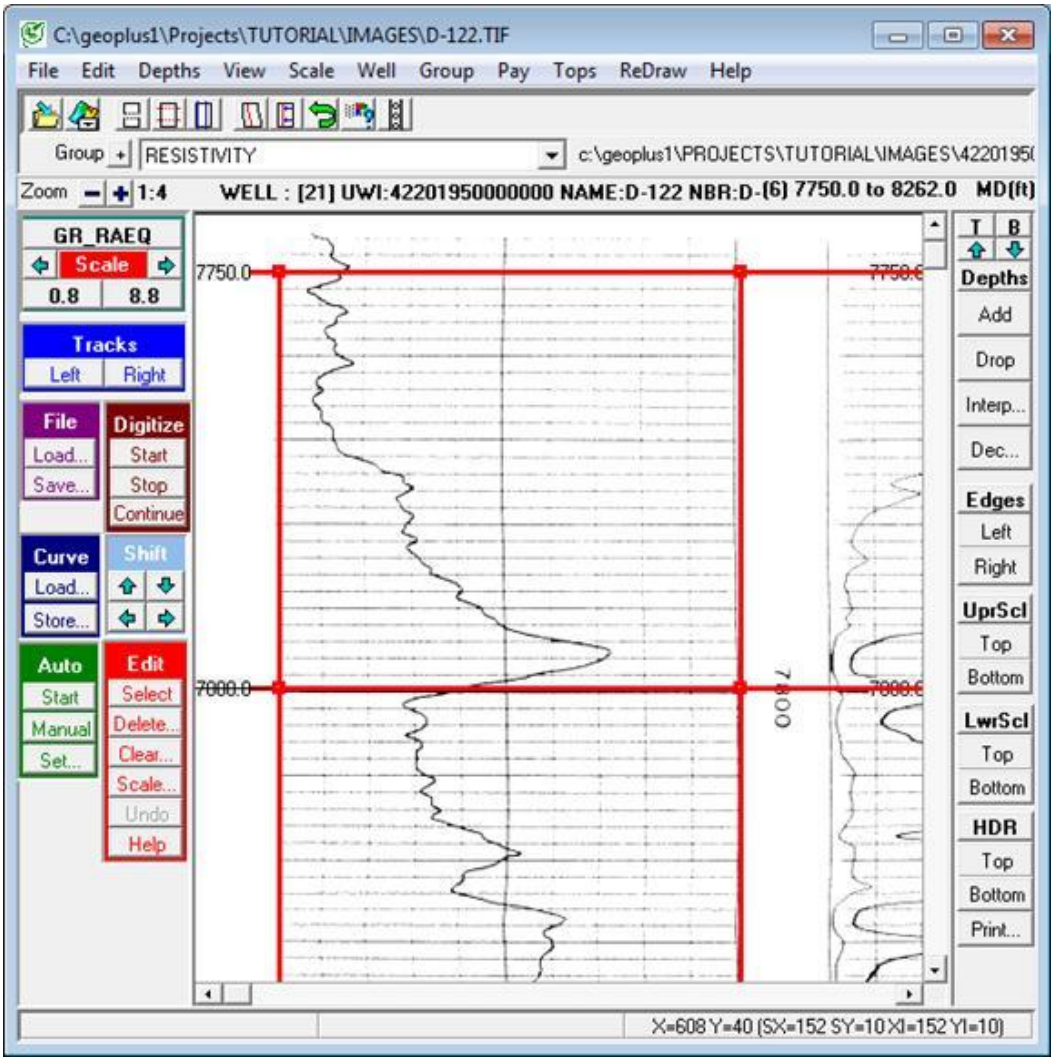
Maximum Duplicate X or Y before Stopping

If PETRA starts tracing a straight line, odds are good that PETRA is following either a horizontal or vertical grid line. This sets the maximum number of duplicate pixels PETRA will allow before stopping.

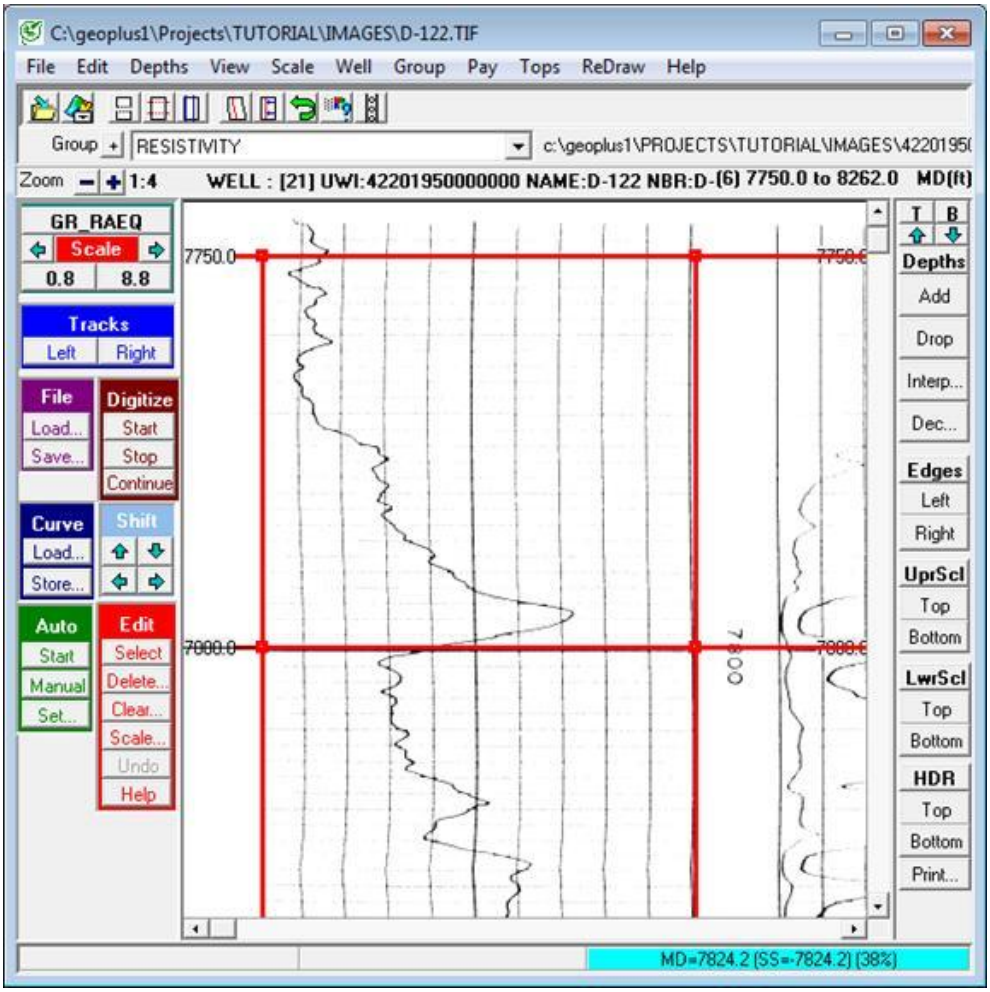


There are a few tricks that can help with auto digitizing. Since the tracing algorithm looks for adjacent dark pixels, it can easily get confused by vertical scale lines and horizontal depth lines. PETRA can filter out straight horizontal and vertical lines. This process modifies your image file, so **be sure not to save over the original image file—make sure you have a backup**. Both of these filters can reduce the clarity of the curves as well, especially where the curves intersect the filtered horizontal or vertical lines. To restore the filtered lines, select **File > Reload Original Image**.

Edit > Filter > Remove Vertical Lines



Edit > Filer > Remove Horizontal Lines

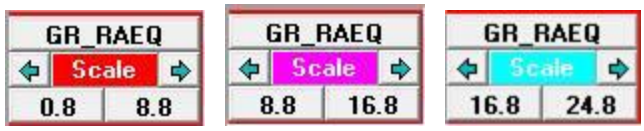


Changing the Track Scales (Curve Wrapping)

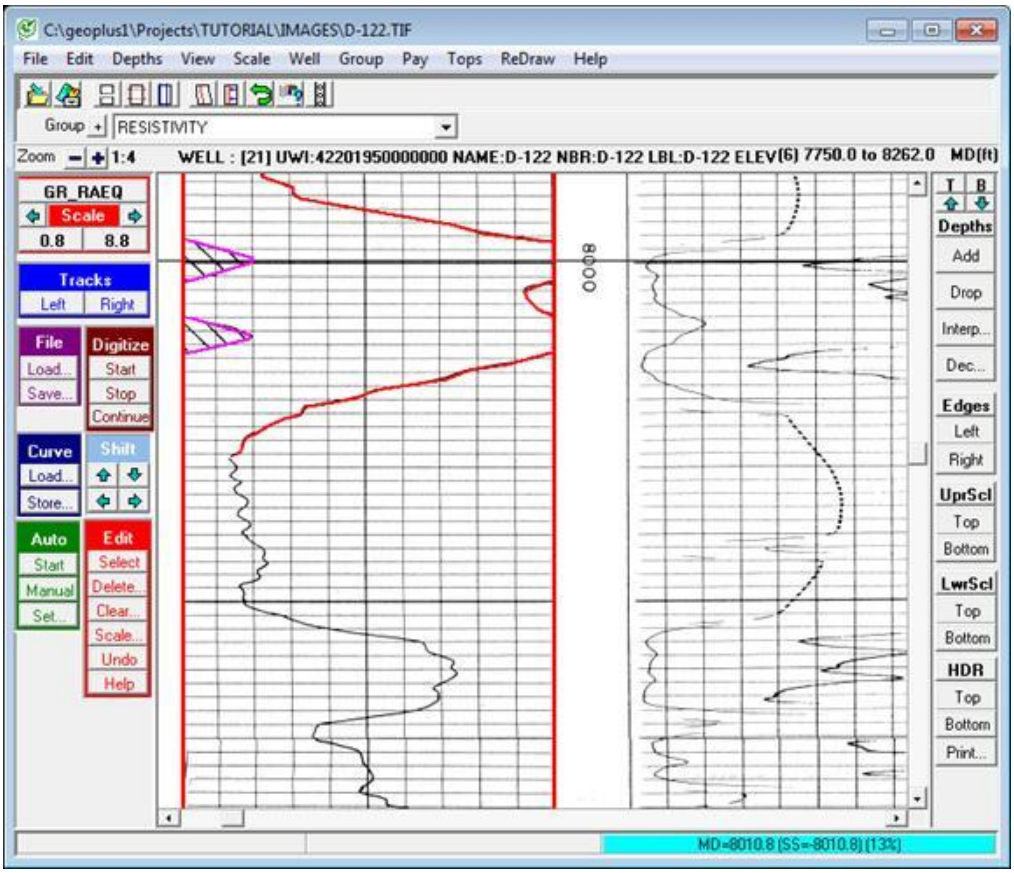
Whenever the curve on the raster image reaches a track edge, the scale will wrap and the curve will reappear on the opposite side of the track. At this point, you will need to stop digitizing and change the scale. The left and right side track scale is displayed near the top of the Digitize Toolbar.

Each curve scale range is displayed in a different color beginning with red for the base scale. There are six colors defined above and below the base scale. To increase the scale range and wrap the curve, click either the right arrow or on the right side of the scale value.

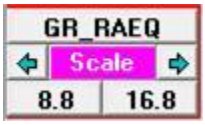
To decrease the scale, click either the left arrow or the left side scale value.

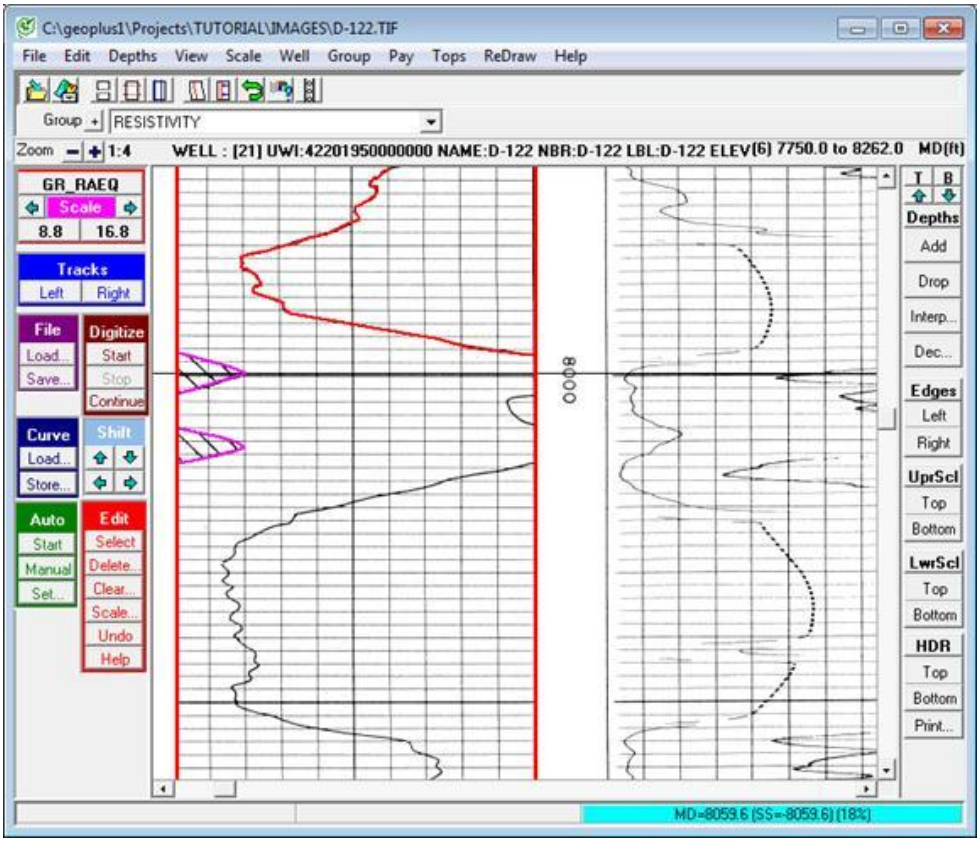


In the example below, the GR curve has started reading above 8.8 and has wrapped around the scale. At this point, right click or select **Stop**.

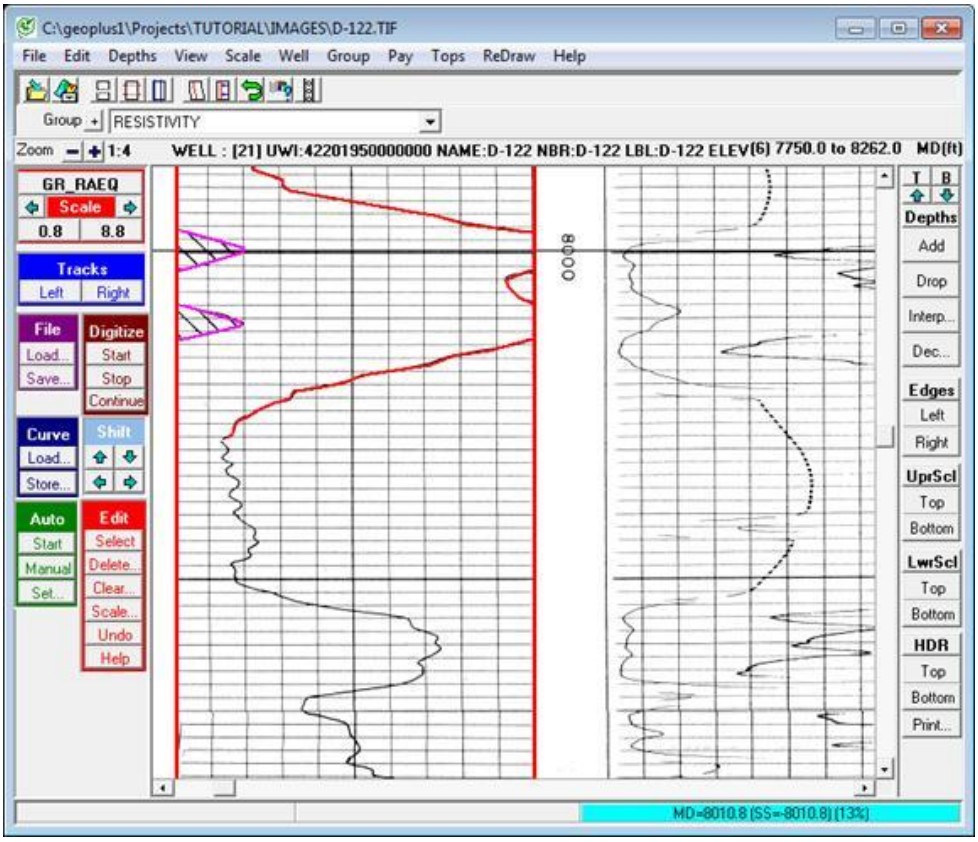


Next, click the right arrow to wrap the digitizing scale to the right from 08-8.8 to 8.8-16.8 and select **Continue** to digitize the wrapped section of the curve. Note that the digitizing line skips a saddle in between the two hot highs; it is perfectly reasonable to skip a section and come back to it later. Notice in the example below that the digitizing scale and the digitizing line are pink to show that they are on a 8.8-16.8 scale.

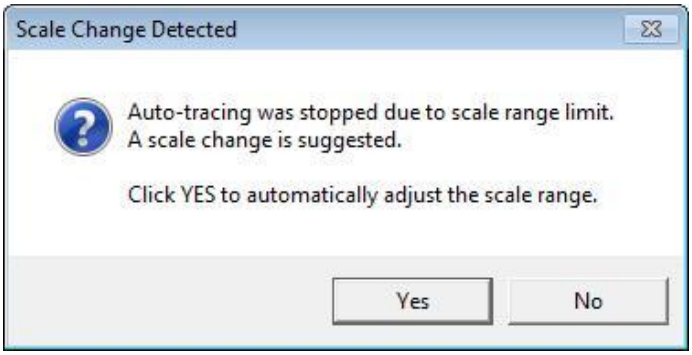




Right click or select **Stop** to stop digitizing. Click the left arrow to wrap the scale back to 0.8-8.8 scale and select **Continue**. Notice that the digitizing line color has returned to red. Make sure to fill in the saddle in between the two high gamma count spikes.



Scale wrapping also works for the automatic tracer. When it detects that the curve has run into the track edge, it will ask if you want it to automatically adjust the curve scale. In the example below, the automatic digitizer has spotted the track edge. Selecting **Yes** will stop the digitizer and automatically wrap the scale for you. The next step is to click the uppermost part of the wrapped curve.

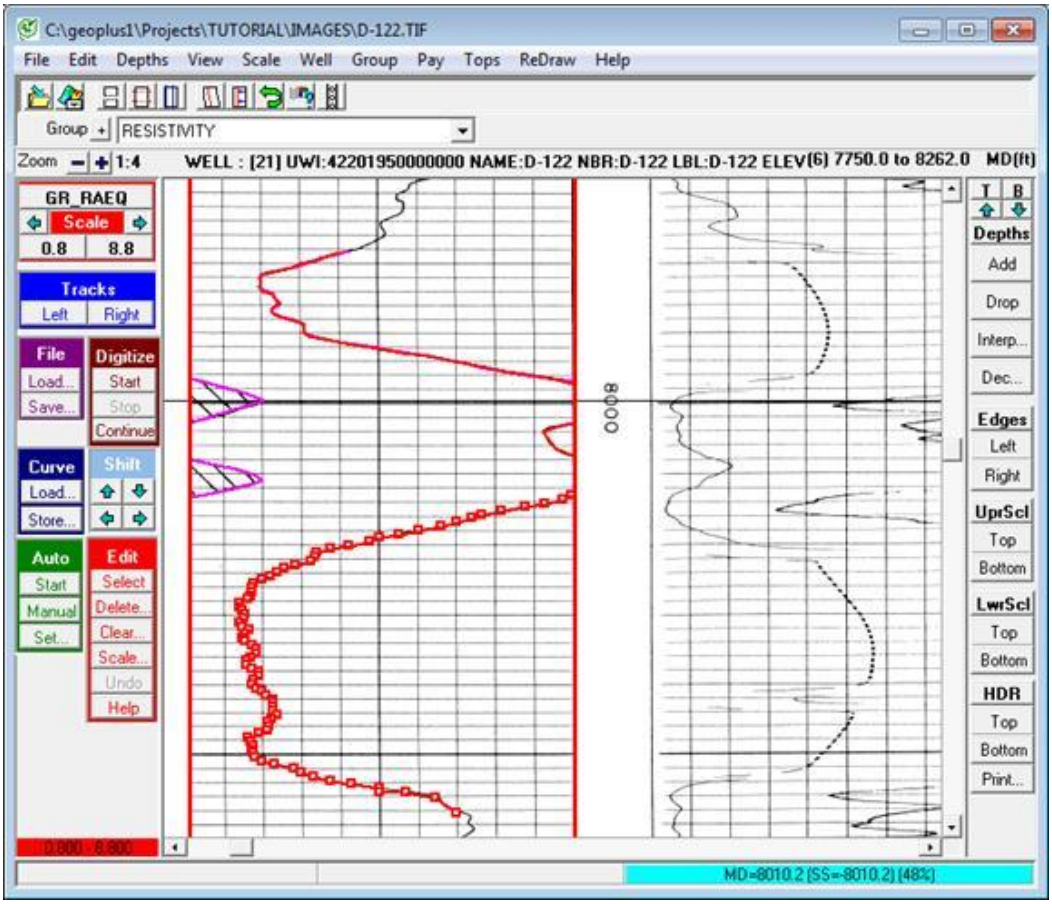

Scale Change Detected
Auto-tracing was stopped due to scale range limit.
A scale change is suggested.
Click YES to automatically adjust the scale range.
Yes
No

Editing a Curve Segment

As mentioned above, digitizing lines are divided into segments. Every time you press **Start** for either manual or automatic digitizing, you create a new line segment. Each segment has its own scale and can be shifted left and right or up and down independently of any other segment.

Selecting a Curve Segment

To edit a curve segment, first click the **Select** button on the red **Edit** toolbar. Alternatively, double-click the curve segment. Selecting a line segment shows each of the control points as small rectangles. To deselect a segment, click the right mouse button. In the example below, there are two curve segments. The top segment is selected, which shows all the control points for that line.



Moving Curve Segment Points

Once a curve segment is selected, you can individually move any control point. Simply left click and drag the control point to its new position. Right clicking deselects the curve segment to show the newly edited curve.

Deleting a Curve Segment

To delete the selected curve section, either click the **Delete** toolbar button or press the **Delete** key on the keyboard. Remember that this deletes the entire curve segment. **If you accidentally delete something, use the Undo Button on the Edit toolbar.**

Changing Curve Scale Range

To change a curve segment's scale range, first set the correct scale range at the top of the digitizing toolbar. Next, select the segment and click the **Scale** button. The curve section will then be set to the scale shown on the top of the scale bar.

Breaking a Curve Segment

You can break a segment into two segments. First, select the segment. Then, hold down the CTRL key and click a segment control point. All points ABOVE the picked point will become unselected. They are now part of a different segment.

Breaking and Deleting Part of a Segment

You can also break a segment into two segments, and then delete the bottom portion. First, select the segment. Then, hold down the CTRL and ALT keys together and click a segment control point. All points BELOW the picked point will be deleted.

Using the Delete Rectangle

You can draw a rectangle to delete intermediate points of the selected curve segment. First, select a curve segment. Next, hold down the SHIFT key and click and drag to form a rectangle. All points within the depth range of the rectangle will be deleted. The segment will be deselected and two new segments will form.

Deleting ALL Curve Segments

Click the **Clear** tool bar button in the Edit Section to delete all curve segments.

Merging of Curve Segments

Normally, when a curve segment is digitized over the same depth interval as a previous curve segment, the new segment is automatically merged into the earlier segment. Merging prevents having multiple segments over the same depth interval. Segments will not be merged when the auto-trace function is used or when the wrap settings are different. You can manually merge segments by first selecting a curve segment, and then pressing the F5 function key.

Bulk Shifting a Curve Segment

Sometimes it is useful to shift an entire curve segment. To move an entire curve segment at one time, first select the segment. Next, select one of the arrow buttons in the **Shift** toolbar. This moves the entire segment in the direction of the arrow.

Saving and Loading Your Work-In-Progress

You can save the digitized curve segments to an external file. This file stores both the digitizing line and digitizing track settings, but not depth-calibration lines. This is useful for creating a backup on a long digitizing project or for when you need to change gears and work on something else.

Storing a Curve to the Database

The final step of digitizing a raster log is to store the traced line as a digital log. In this step, the curve segments are resampled to the specified sample rate and merged together. When segments overlap in depth, earlier segments are replaced by later ones. In other words, where lines overlap, PETRA will use the last drawn line. Once stored, the digital curve is available in PETRA's database for drawing in cross sections or calculations.

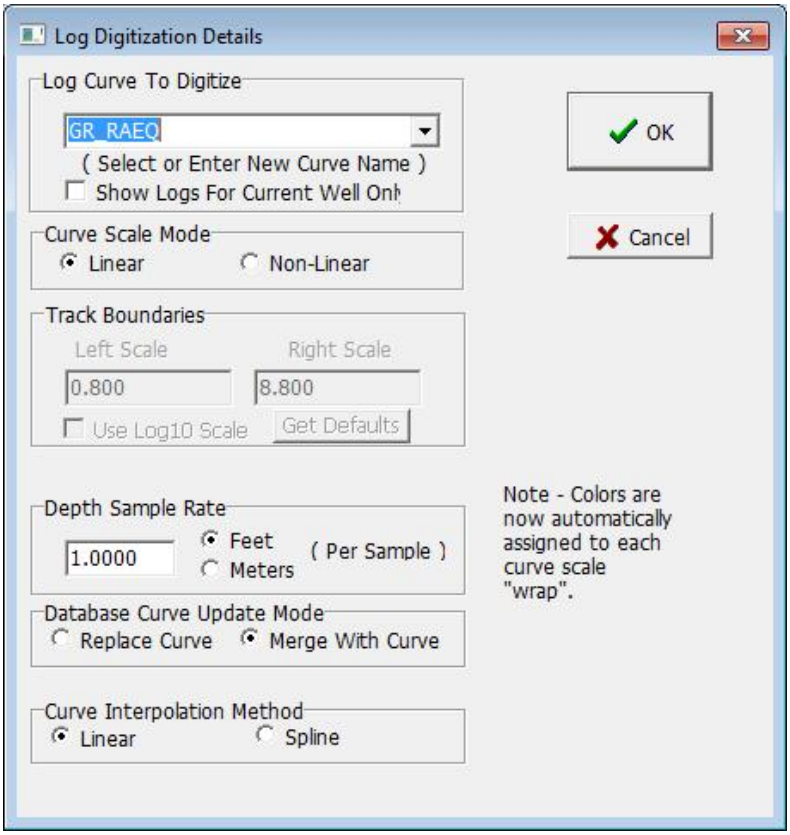
To store a curve, select the **Store** button on the blue **Curve** toolbar. This brings up the Log Digitization Details box. First, select the digital curve name you want the curve stored as. In the example below, we'll stick with GR_RAEQ.

Notice that the options under Track Boundaries are grayed out—since each segment stores its own scale, there's no need to change this.

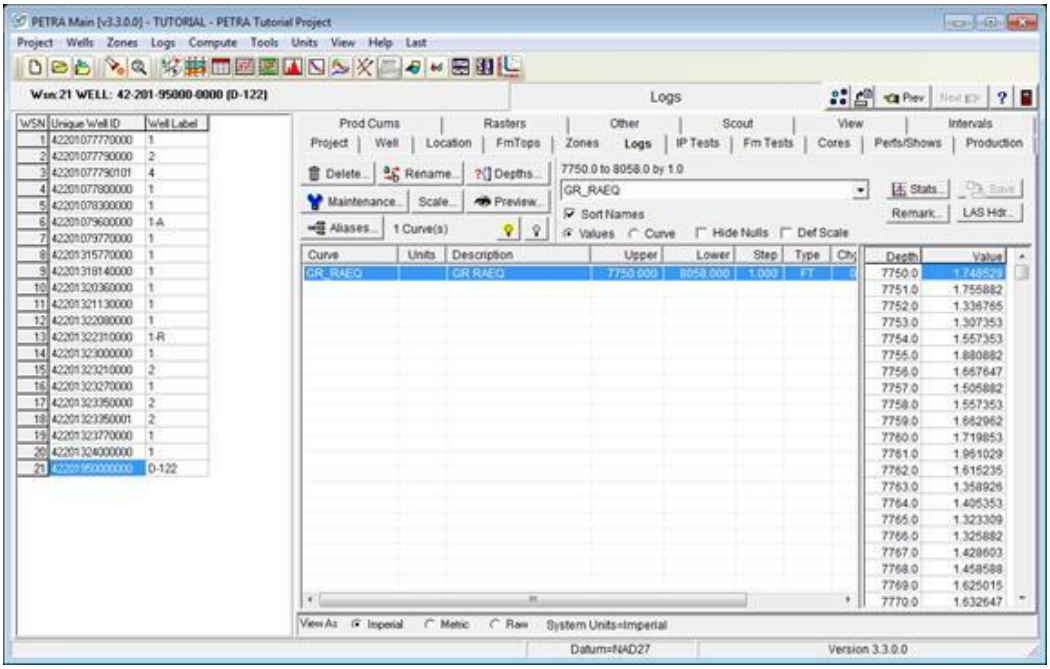
Next, set the depth sample rate, which just sets how many samples will be stored per unit of depth. The default is 1 foot, as shown in the example below. If you will be using this log for calculations with other logs, make sure that this number matches the sample rate of your other digital logs. Most digital logs are stored on a half foot sample rate.

Next, set the Database Curve Update Mode. If there's already a curve stored with the same curve name, this determines how the digitized log will be stored. Replace Curve will completely erase the old digital log and replace it with the new digitized curve. Merge With Curve will keep the old log and only replace the sections you've digitized.

Finally, set the curve interpolation method. The linear method draws a straight line between control points, while a spline attempts to fit a curve between control points. The interpolation method on the main screen is linear, so most people digitizing already account for that when picking points. In other words, people mostly place the points close enough together for a linear interpolation to accurately trace the curve line.



The digitized log now appears in PETRA's database and can be used for calculations or display. In the example below, notice how GR_RAEQ now has a value for every depth.

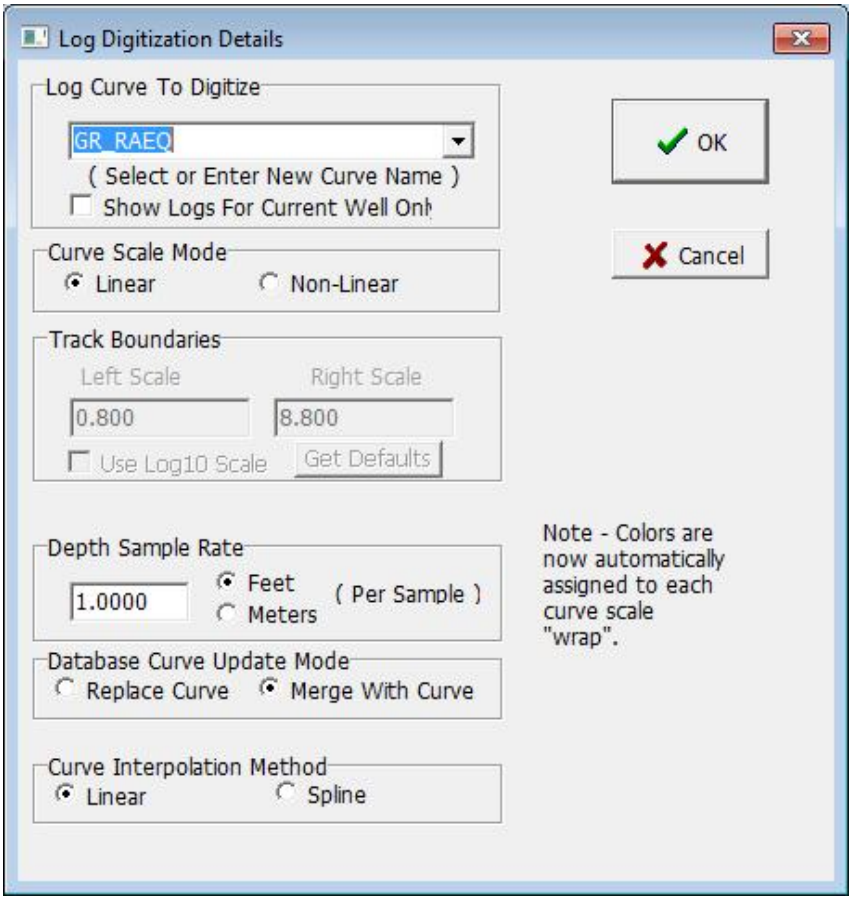


Loading a Curve from the Database

The Load button under the Curve section lets you load a digital log curve from the database to display on top of a depth-registered raster curve. This is particularly useful for doing quality control on someone else's digitizing work.

First, set the left and right track scales. Next, select the red **Scale** button at the top of the digitizing toolbar.

Next, select the pre-existing digital log curve on the **Log Curve to Digitize** drop-down menu. This is the log you'll load into the digitizing screen. Select **OK**.



Finally, select the **Load** button on the **Curve** toolbar. This will replace any digitizing lines on the main screen with the digital data from the selected curve in the database.

Starting Another Curve

If you want to digitize more than one curve, you will need to use the **Edit > Clear** button on the toolbar. This will remove previously digitized segments from memory so they don't get stored as part of the new curve.

6

Mapping Module

The mapping module provides essential display functions for any project.

In the Main module, click the **Mapping** icon or the **Tools→Mapping** menu to display the map module.

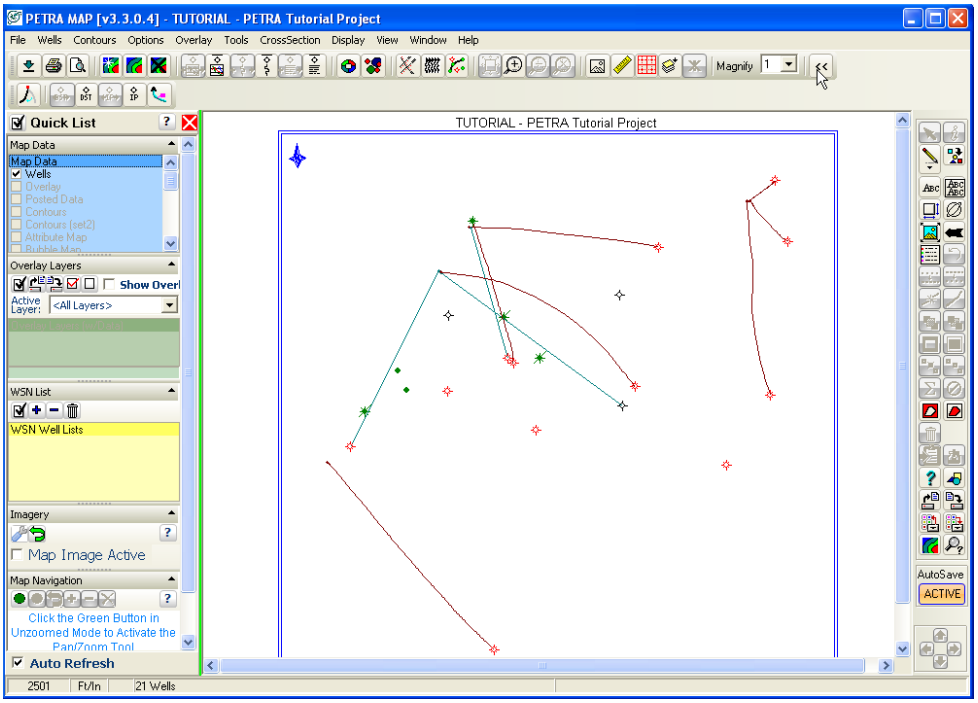
Mapping Module Overview

The mapping module is initiated using the Tools→Mapping menu option on the Main screen or the Mapping icon.

When the map opens, it retrieves certain information about each well. A Loading Wells fuel gauge shows the progress while the map is initialized. Once initialized, the well symbols appear on a white background. Note the map scale in the lower left corner of the mapping window as well as the number of wells that are displayed on the map.

This icon, when clicked, shows the second row of icons at the top of the map.

This icon, when clicked, hides the second row of icons at the top of the map.

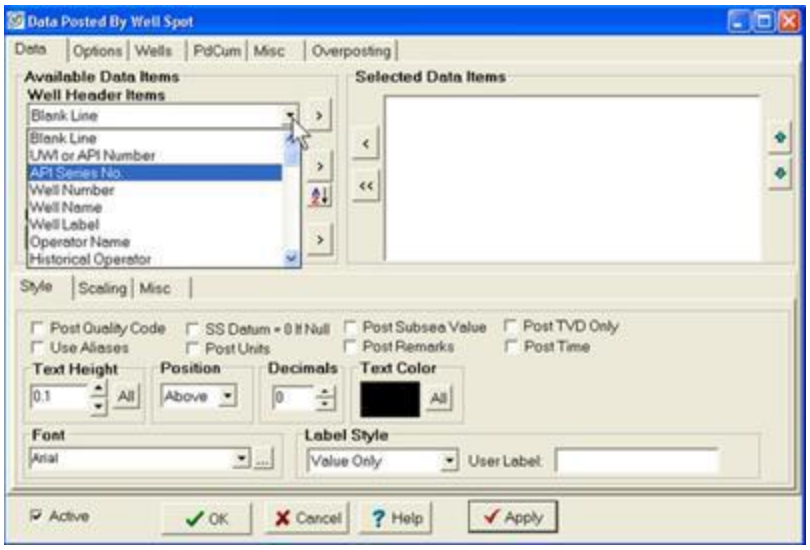


The wells are shown with the Wells→Directional Survey→Enabeled option turned on. The well symbols are not labeled initially. You can add annotations around the well symbol using the Options→Data Posting menu or the Post Well Data icon to display the Data Posted By Well Spot dialog screen.

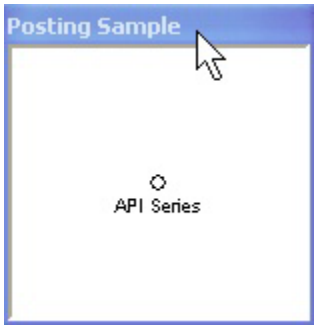
1. Click the **Well Header Items** drop-down button under the **Available Data Items** options.

2. Click the **API Series No.** data item, and then click the **Move Selected Item** button to move the data item to the Selected Data Items list box.

3. Under the Data Item Details menu, change the Position to **Above**.



Note: There is a Posting Sample display in the upper left portion of your screen. This shows how the data would look on the map after it is posted.

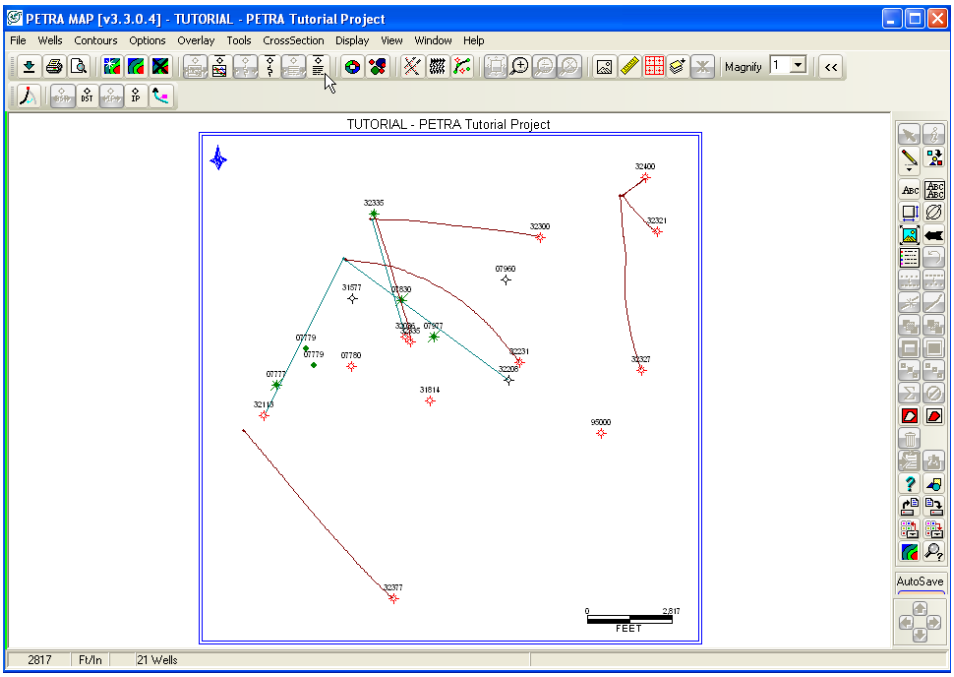


4. Click **OK**.

   The map is redrawn with well labels plotted above each well.

Note: You can move the **Data Posted By Well Spot** dialog screen to the right, if it is on top of the Posting Sample window. This allows you to see the Posting Sample window, which shows you how the well will be annotated. This window is displayed in the upper left portion of your screen. The Post Sample screen shot is shown in the note above.

The Map below is shown with the Quick List feature turned off.


PETRA MAP [v3.3.0.4] - TUTORIAL - PETRA Tutorial Project
File Wells Contours Options Overlay Tools CrossSection Display View Window Help
Magnify
TUTORIAL - PETRA Tutorial Project
AutoSave
2817 Ft/In 21 Wells

Quick List feature

This feature consists of three list boxes, an Imagery section, and a Map Navigation section down the left side of the map window. The upper list provides quick access to map data items like posted text, contours, attribute and bubble map templates. The middle list displays all overlay layers containing data. The lower list allows you to select multiple wsn lists to control the wells on the map.

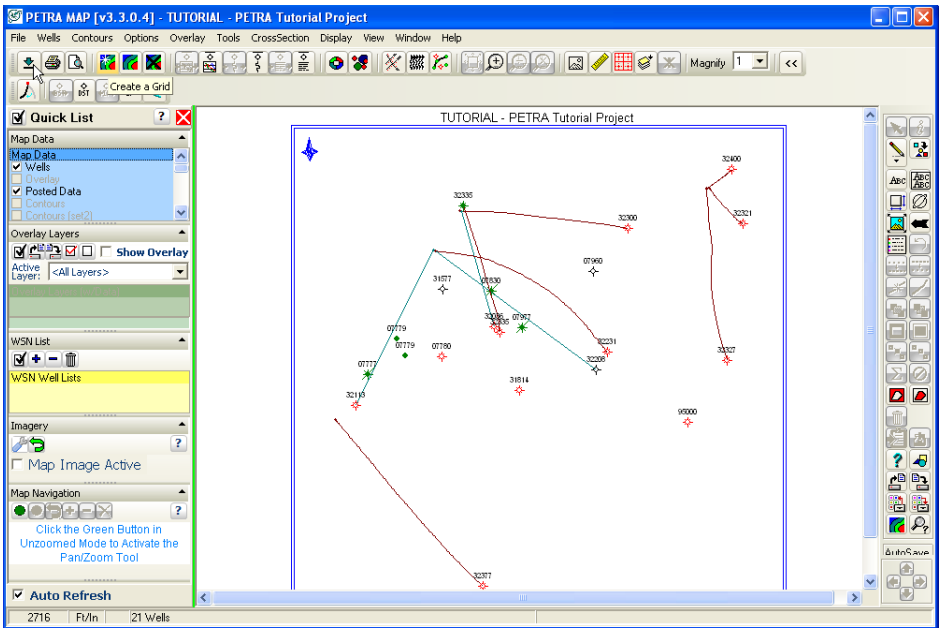
The Imagery section has a Map Image Active check box that is checked if you subscribe to an imagery service and have a valid URL, user name, and password entered for a Web Map Service that you are subscribing to.

The Map Navigation section is used to quickly activate the Pan/Zoom feature for the map module.

The quick lists are made visible using Show Quick Lists icon located to the left of the Print icon. An auto refresh option at the bottom of the quick list panel allows immediate map refresh when a list check box is toggled. When the quick lists are not in auto refresh mode, you must click a small apply button at the top of the lists.

There is a section at the bottom to activate the Pan/Zoom Tool. Click the **Open** icon to activate.

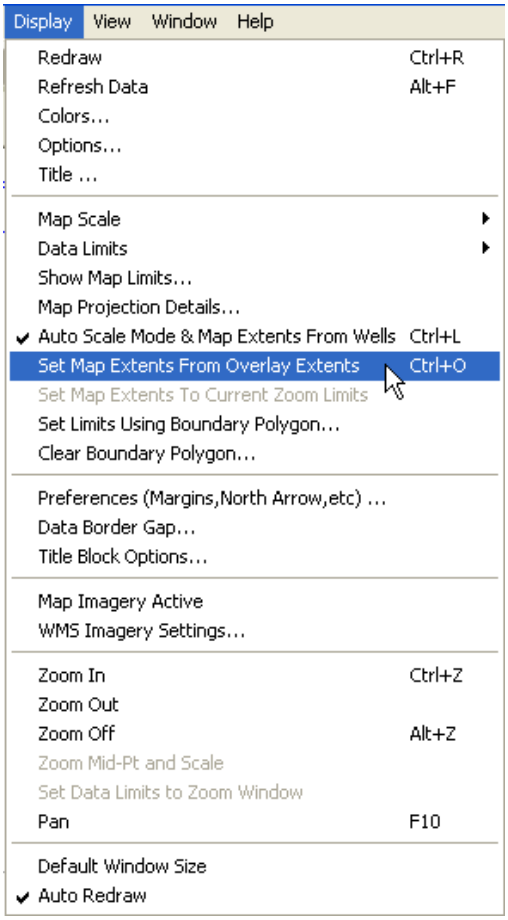
In the Map Data list, double-click an item to bring up the associated dialog screen for selecting or changing the parameters that are needed for the map. To turn the item off, click the check box to the left of the item. If the item is not grayed out, you can turn the item on by clicking the check box to the left of the item. If the item is grayed out, double-click the item to set the parameters for the item.

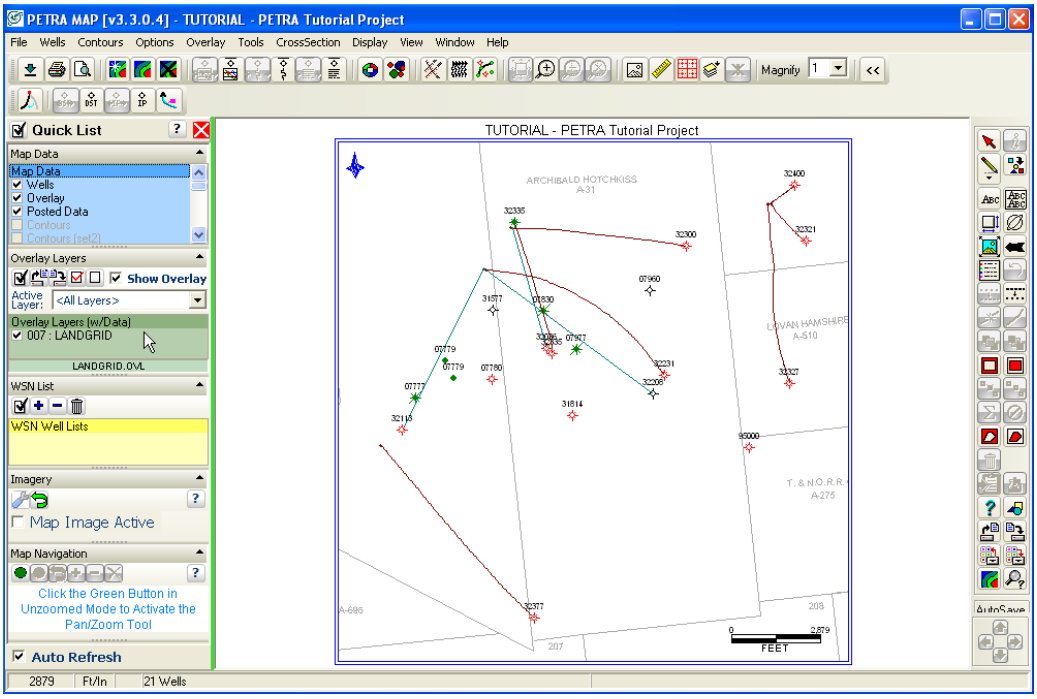


Land Grid Overlay

Political and cultural data are available from commercial data suppliers, for example, IHS, Whitestar, or Tobin Data Graphics. The data is also available from the WEB at various locations. PETRA can import these data using the map Overlay utility (or Direct Connect when using IHS). This tutorial contains a sample of a land grid that has been imported from the original vendor's format and saved as a binary Overlay file. You can load and display the land grid by selecting the **Overlay→Load→Overlay File** and selecting the file named **LANDGRID.OVL**. The map overlay is discussed in more detail later in this tutorial.

To show all of the cartographic data that was loaded into the overlay, click **Display→Set Map Extents From Overlay Extents** menu.


Display
View
Window
Help
Redraw Ctrl+R
Refresh Data Alt+F
Colors...
Options...
Title ...
Map Scale
Data Limits
Show Map Limits...
Map Projection Details...
Auto Scale Mode & Map Extents From Wells Ctrl+L
Set Map Extents From Overlay Extents Ctrl+O
Set Map Extents To Current Zoom Limits
Set Limits Using Boundary Polygon...
Clear Boundary Polygon...
Preferences (Margins,North Arrow,etc) ...
Data Border Gap...
Title Block Options...
Map Imagery Active
WMS Imagery Settings...
Zoom In Ctrl+Z
Zoom Out
Zoom Off Alt+Z
Zoom Mid-Pt and Scale
Set Data Limits to Zoom Window
Pan F10
Default Window Size
Auto Redraw



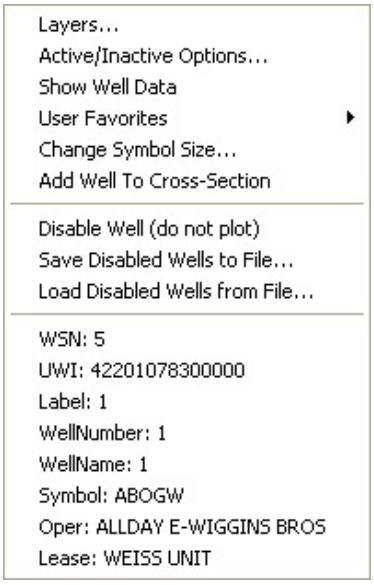
Selecting a Well on the Map

A single click a well symbol highlights a well. Several editing options are available for a selected well, including moving the location, dropping from the map, or deletion from the project.

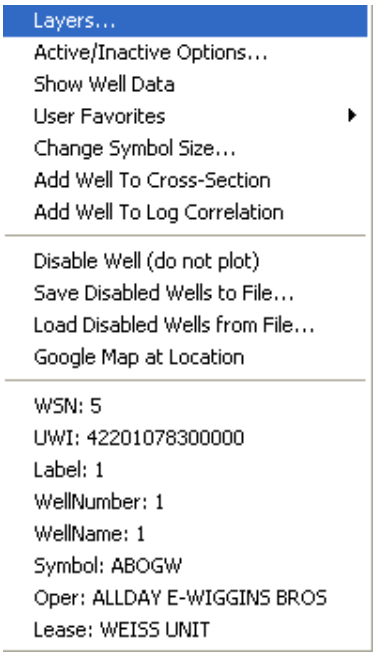
Viewing Data for a Specific Well

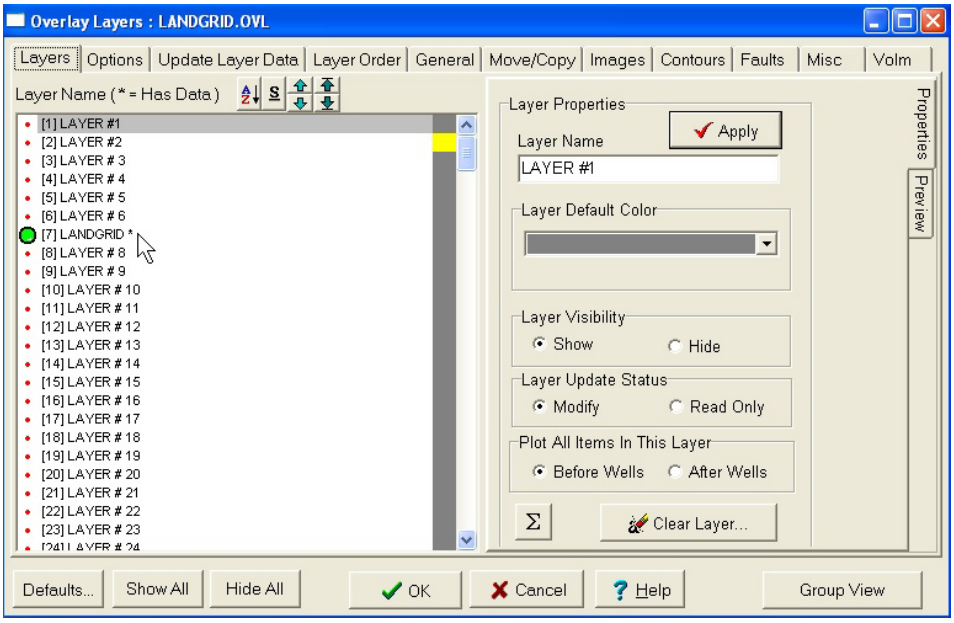
Well information is displayed whenever you click the right mouse button on a well symbol.

A pop-up menu shows the basic well header data with an option to select items to be displayed for the selected well and to change the symbol size for that well.

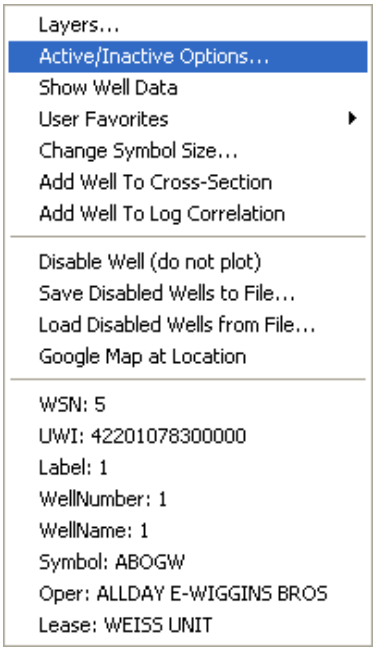


When you select the **Layers... option**, the ***Overlay Layers*** dialog screen is displayed as shown below.

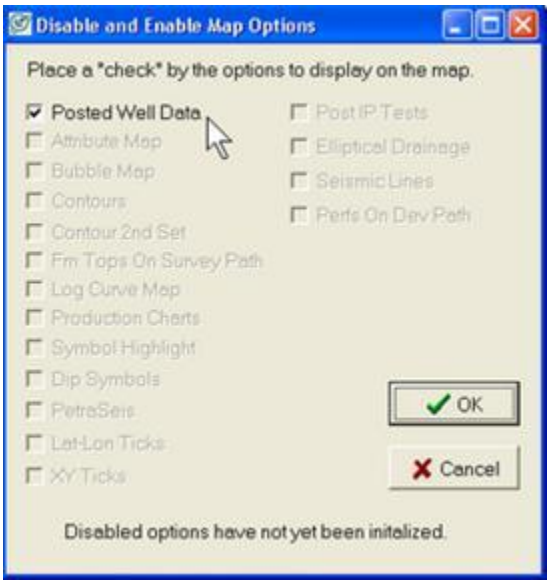




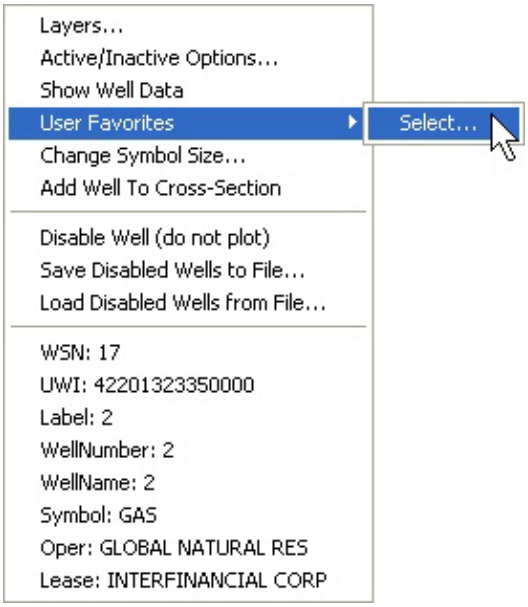
When you select the **Active/Inactive Options...** option, you see the ***Disable and Enable Map Options*** dialog screen as shown below. Place a check by the options that you want to display. If there is an option that you want to disable, click the check box to the left of the option(s) that you want to disable.

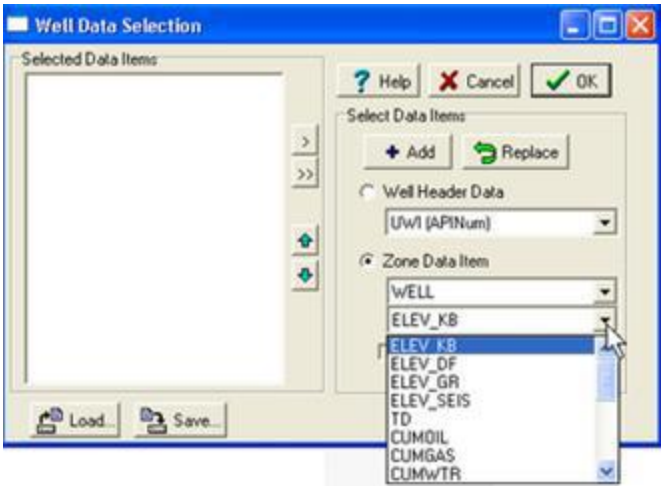


For the tutorial, only the Posted Well Data is displayed; therefore, that is the only item that can be disabled.



When you click the **User Favorites→Select…** option, a dialog screen is displayed where you can select additional items that you would like to see displayed when you use the right click a well option.





1. Click either the **Well Header Data** drop-down list button

   OR

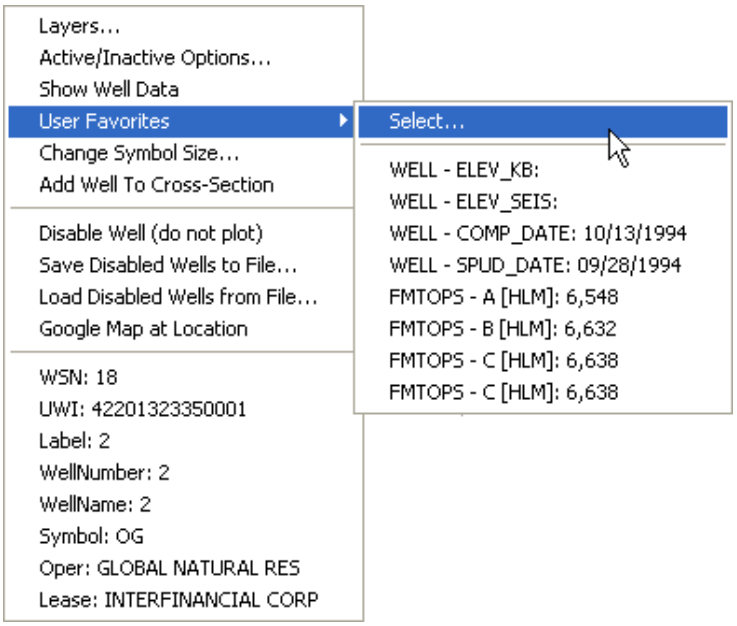
   the **Zone Data Item** drop-down list button .

   A list of items is displayed from which you can select the items that you would like to see displayed when you right click a well, and then click the **User Favorites→Select…** option.

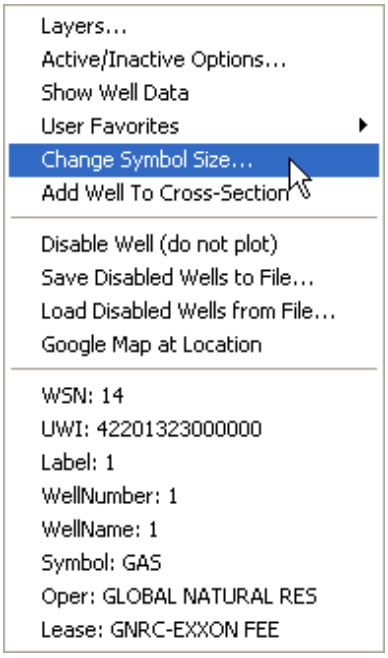
2. Click the **Add** button to add the item to the Selected Data Items selection list.
3. Click **OK** to close the ***Well Data Selection*** dialog screen.
4. Right click a well, and then click the **User Favorites→Select** option.

   You see your favorites displayed in the drop-down display screen. The selected favorites are shown in the right hand display.

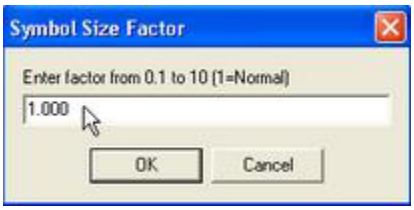
5. To change the User Favorites, click the **Select…** menu item and add or remove the items that you want to see displayed.



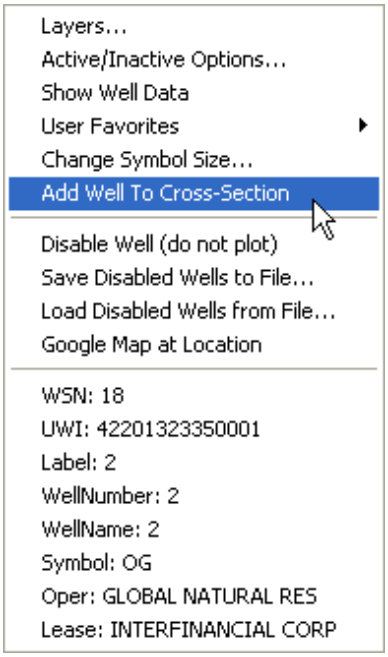
6. Click the **Change Symbol Size...** option to change the symbol size.



If you want the symbol to be larger, enter 1.5 or 2.0. To make the symbol smaller, enter .75 or .5. The symbol size adjusts appropriately.

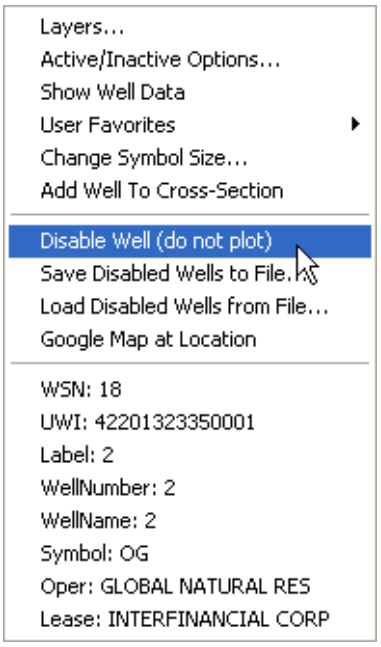


7. If you want to add an additional well to a cross section, click the **Add Well To Cross Section** option. The well is added to the cross section, if the cross section is active.

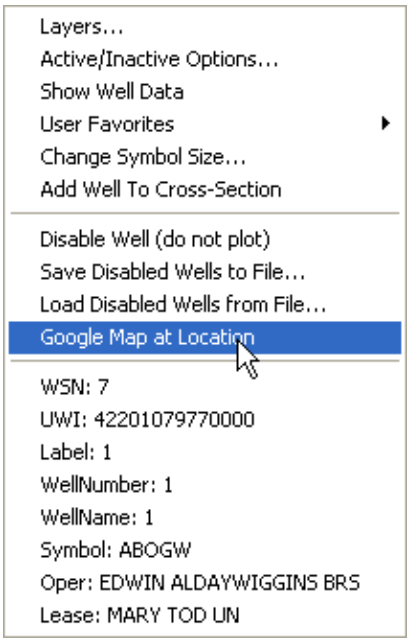


If the cross section is not active, you see the following message.

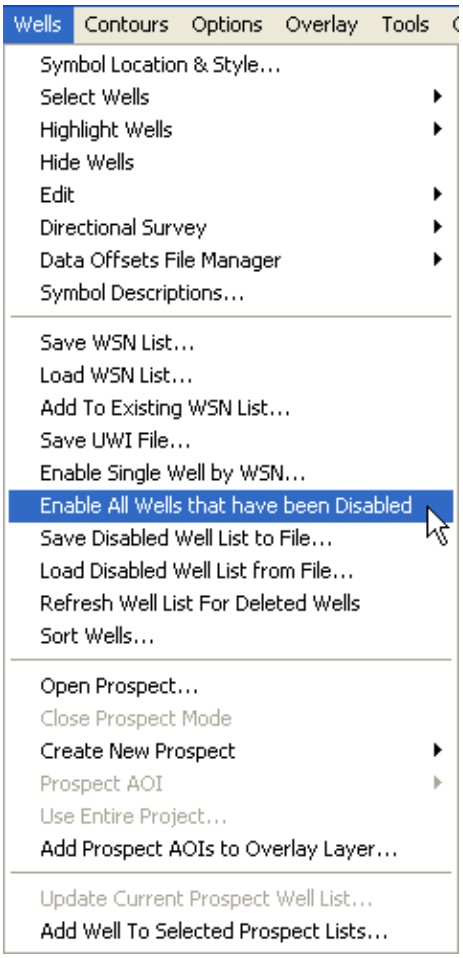
8. To disable a well so that it is not plotted on the map, click the **Disable Well** (do not plot) option. The well is dropped from the map display.



9. To re-display the well location on a Google Map, click the **Google Map at Location** option.



10. To re-display the disabled well(s) on the map, click the **Wells → Enable All Wells that have been Disabled** menu option.



When you double-click a well symbol with the left mouse button, PETRA immediately jumps to the Main module screen positioned at the selected well if that well is one of the wells that is selected in the Main module. This feature can be used to quickly access any data for a specific well. To return to the map, either click the **Map - PETRA** task on the Windows task bar, or click the **Mapping** icon . The task bar from XP is shown below.

To return to the Map with the cursor pointing to the selected well, click the **Highlight Well On Map** icon or use the F8 function key.

Finding a Specific Well

To locate a specific well on the map, first go to the Main module and select the desired well in the well list. Then, click the **Highlight Well On Map** icon or use the F8 function key. The system jumps to the map with the selected well highlighted. The mouse cursor points to the highlighted well.

Note: This feature only works when the mapping module is open.

Zooming

You can enlarge a portion of the map by setting a zoom rectangle.

1. Select the **Display→Zoom In** menu or click the **Zoom In** icon.

   The cursor changes to a magnifying glass.

2. Position the cursor at the upper left corner of the region to be enlarged.
3. Click and hold down the left mouse button while dragging the lower right corner of the rectangle so that it encloses the region to enlarge.
4. Release the left mouse button.

   The map redraws showing that portion of the map falling inside the zoom window.

   Note the change in map scale. You can repeat the process to further zoom in.

5. Use the **Display→Zoom Out** menu or icon to revert to the previous zoom window.

   The **Display→Zoom Off** or **Turn Zoom Off** icon sets the map back to the original limits.

Panning and Scrolling

Once in the zoom mode, you can scroll up, down, left or right by pressing one of the arrow keys while holding down the shift key. You can also pan in any direction by clicking the **Pan**

icon and clicking and dragging with the left mouse button to the new position. The screen is re-drawn with the map positioned at the new location.

If you prefer to use the keyboard to navigate, here are the function keys that can be used:

Menu	Function Keys
Display→Zoom In – [While zoomed in, press the + and – keys to zoom in and out by 1/4 of the zoomed extents.]	Ctrl+z
Display→Zoom Off	Alt+Z
Display→Pan	F10

Posted Base Maps

Base maps typically show various information posted around each well symbol. Data posting options are available using the Options→Data Posting menu or the Post Well Data icon. Up to 50 data lines can be posted. Each item can be in one of 4 blocks: located above, below, left or right of the well spot. The text height and color can be set for each line item. Text sizes can be specified in inches or Map X/Y's.

Selecting and Formatting Posted Data

To select and format posted data

1. Select the **Options→Data Posting** menu or click the **Post Well Data** icon to display the ***Data Posting By Well Spot*** dialog screen.

2. Notice the Available Data Items section in the upper left portion of the dialog box. Posted data items are chosen from this section and added to the Selected Data Items list on the right by clicking the associated **Add Well Header Items** button.

   For example, select the **API Series No** from the **Well Header Items** group and click the **Add Well Header Items** button just to its right.

   A line reading **API Series No.** is added to the Selected Data Items list.

3. You can change the color by clicking the color below the **Text Color** option.

   A Color palette is displayed.

4. Click the color that you would like to assign to the text, and then click **OK.**

5. Set the Position to **Above**. Set the Text Height to read **0.1.**

6. Click the **Options** tab, and click the drop-down button to the right of **All Sizes Are In** to select inches.

Next, you can add a line item below the well showing the total depth of the well.

1. In the Available Data Items section, locate and select the **Zone Data Items** zone called **WELL** and the item called **TD**.

2. Click the **Add Zone Item** button next to the zone drop-down list.

   The phrase **WELL - TD** is added to the Selected Data Items list.

3. Set the position to **Below** and the text color to black. Try adding other data items noting the change in the Posting Sample window.

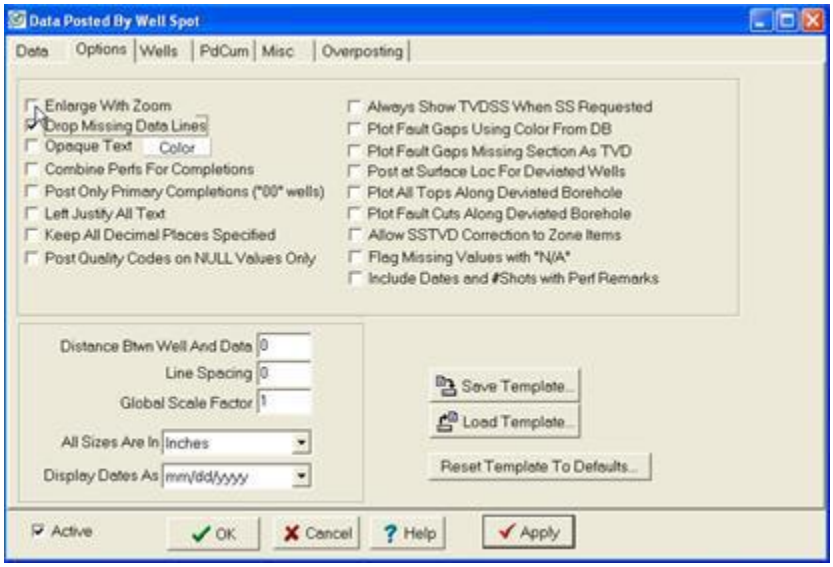
4. Click **OK** to return and redraw the map.

Try zooming in to reduce clutter.

1. Once again, invoke the Data Posting option. Click the **Options** tab and click the box beside the **Enlarge with Zoom** option.

2. Click **OK** to redraw the map.

   Now when you zoom in, the posted data text enlarges somewhat making the text easier to read.



To turn off or disable data posting, invoke the Data Posting option once more.

1. Click the check box beside the **Active** option so that it is in the unchecked state.

2. Click **OK** to return and redraw the map without any well annotation.

   The posting options are retained and can be reactivated by simply invoking the posting

option, and then clicking the **OK** button.

Note: Data posting can also be disabled and/or reactivated from the Options→Active/Inactive menu or from the Quick List menu, which can be displayed on the left side of the map.

The **Options** Tab has several check boxes that can be set. There are some options that can control the distance between the well and data; the line spacing for the text, a global scale factor, and a drop-down list to set the sizes in inches or map XYs.

The **Wells** Tab has some additional options that you can set. You can post data for all wells displayed on the map, which is the default, highlighted wells only, or wells that you have selected in a Well Sequence Number (WSN) List.

The **PdCum** Tab has options for posting the PdCum data.

The **Misc** Tab has options for Zone Items Legend data, Legend Text Size Multiplication Factor, and a Wrap Zone Text Items to a specified number of characters. The default is to not wrap the text data.

The **Overposting** Tab has options for the Manually Shifted text as well as Automatic Overpost Resolution. There are check boxes to Hide Connecting Line and Draw Top Connecting Line.

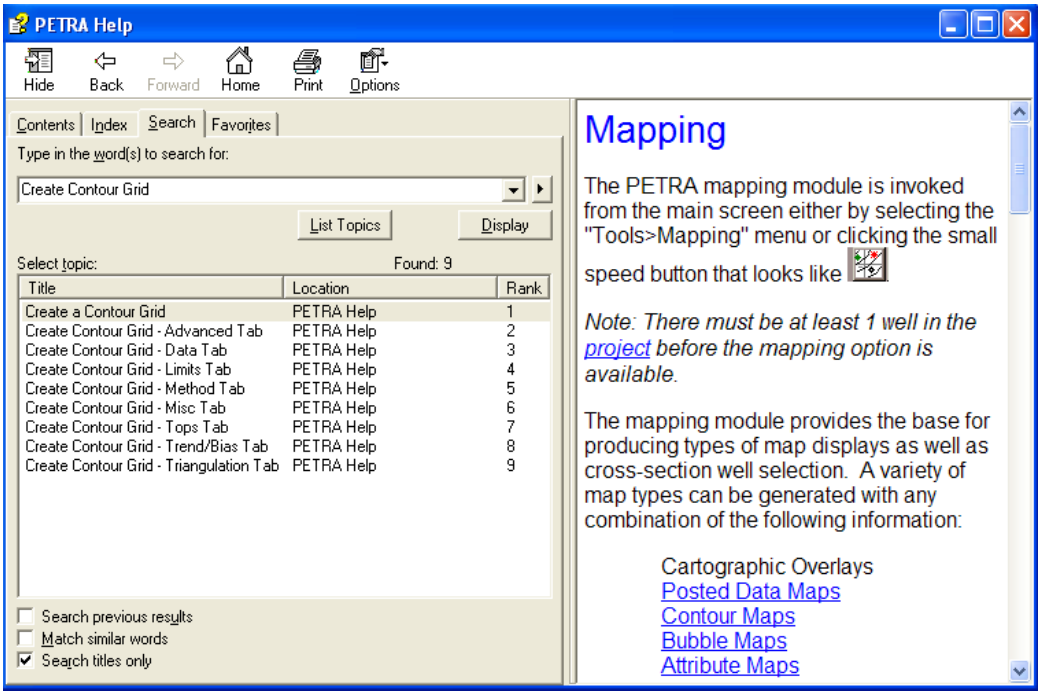
If you have moved text, there is a button to clear shifted text for all wells, labeled **Clear DB Shifted Text....**

Contour Maps

Contour maps are generated by constructing gridded surfaces from wells, faults, overlay contours, user control points, and/or seismic z values. A grid file contains regularly spaced values interpolated from the original data. Contours are drawn from the gridded surface data. PETRA provides an easy to use interface for choosing gridding and contouring options.

Grid files cannot be displayed for a projection that is different than the one it was created with. The file contains X/Y values that are based on the projection the Map is in when the grid is created.

A series of help documents titled *Create Contour Grid* are available in PETRA's help to outline the options for creating a contour grid. Click **Help** in the Map Module. When the ***PETRA Help*** dialog screen is displayed, click the **Search** tab. Enter **Create Contour Grid** in the **Type in the word(s) to search for:** data field. Click the **List Topics** button.


PETRA Help
Hide
Back
Forward
Home
Print
Options
Contents
Index
Search
Favorites
Type in the word(s) to search for:
Create Contour Grid
List Topics
Display
Select topic:
Found: 9
Title
Location
Rank
Create a Contour Grid PETRA Help 1
Create Contour Grid - Advanced Tab PETRA Help 2
Create Contour Grid - Data Tab PETRA Help 3
Create Contour Grid - Limits Tab PETRA Help 4
Create Contour Grid - Method Tab PETRA Help 5
Create Contour Grid - Misc Tab PETRA Help 6
Create Contour Grid - Tops Tab PETRA Help 7
Create Contour Grid - Trend/Bias Tab PETRA Help 8
Create Contour Grid - Triangulation Tab PETRA Help 9
Search previous results
Match similar words
Search titles only
Mapping
The PETRA mapping module is invoked from the main screen either by selecting the "Tools>Mapping" menu or clicking the small speed button that looks like
Note: There must be at least 1 well in the project before the mapping option is available.
The mapping module provides the base for producing types of map displays as well as cross-section well selection. A variety of map types can be generated with any combination of the following information:
Cartographic Overlays
Posted Data Maps
Contour Maps
Bubble Maps
Attribute Maps

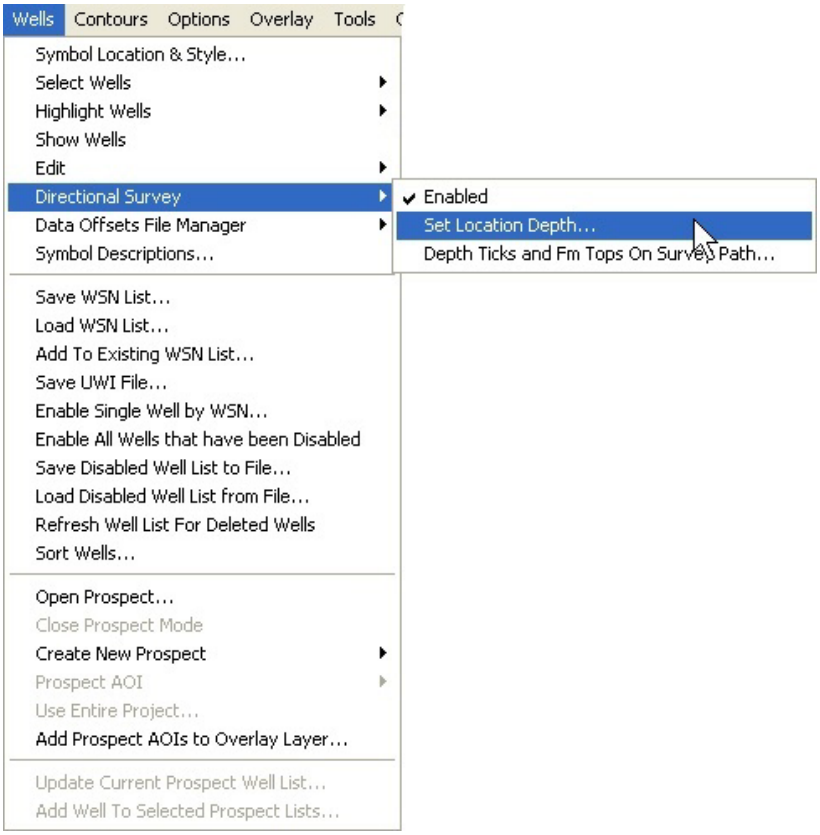
Creating a structure map grid

To illustrate the gridding and contouring process, create a structure contour map of the A formation top.

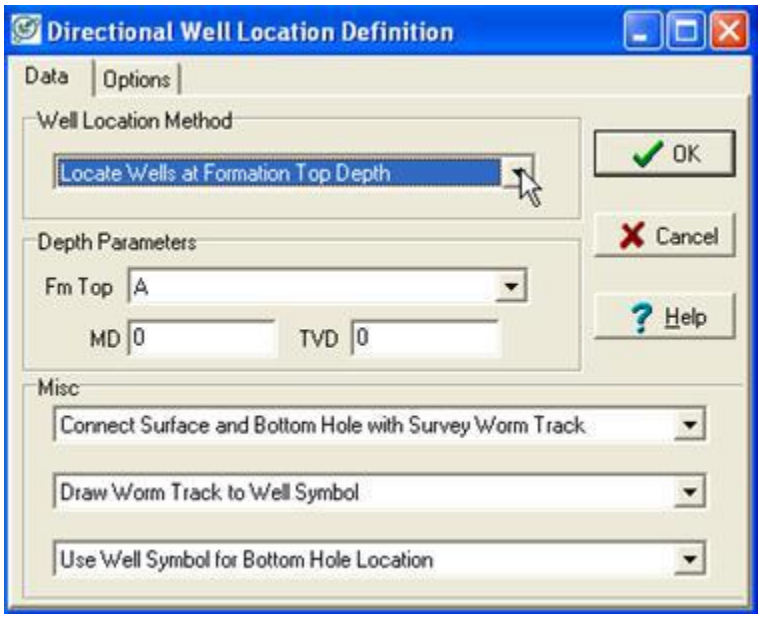
Note: The following set of steps is only required for projects containing directional wells. Before going through these steps, you might want to read the next **Note** below.

The well locations currently displayed are based on the maximum directional survey depths. Before we grid the data, it is important to set the well locations to the projected location of A formation.

1. Use the **Wells→Directional Survey→Set Location Depth** menu to display the **Directional Well Location Definition** dialog screen.



2. When the ***Directional Well Location Definition*** dialog screen is displayed, click the drop-down button and select the **Locate Wells at Formation Top Depth** option.



3. Click the **Depth Parameters Fm Top** drop-down list button and select the **A Formation**.

4. Click the **OK** button with the green check.

   The new well locations are recomputed.

We are now ready to create the A formation grid.

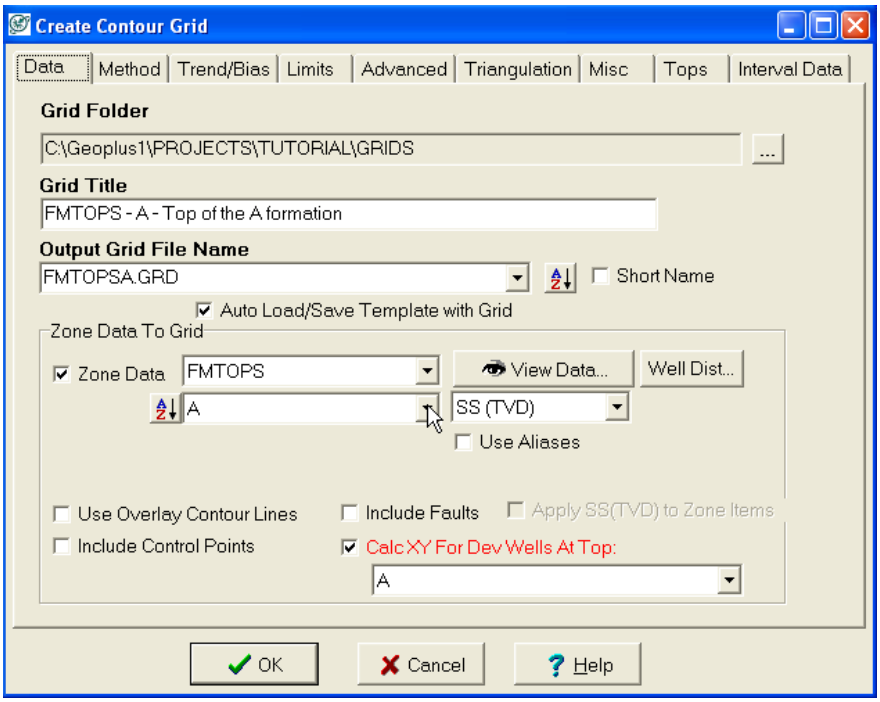
1. Begin by choosing the **Contours→Create Grid** menu option.

   OR

   the **Create a Grid** icon.

   The Create Contour Grid screen is displayed.

Note: You can also use an option on the **Create Contour Grid** dialog screen to set the proper XY for the formation that is to be contoured by checking the Check box to the left of **Cal XY For Dev Wells At Top**:. The drop-down list button can be used to select the desired top.



2. From the **Data** tab section, locate and select the **FMTOPS** zone name and the **A** formation top name.

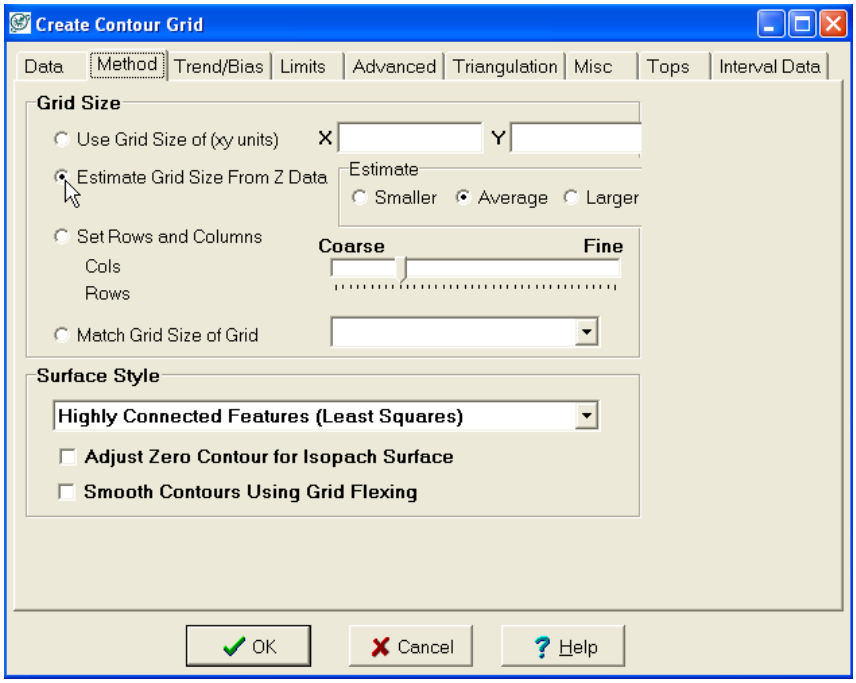
   Note how the grid title and file name fields adjust automatically. You can change these fields if you wish or use the defaults.

   There should be a check mark by the box that reads Zone Data.

3. Place a check mark by the box labeled **Calc XY For Dev Wells At Top:** to get a structure map and not a map of the measured depths.

4. Click the **Method** tab.

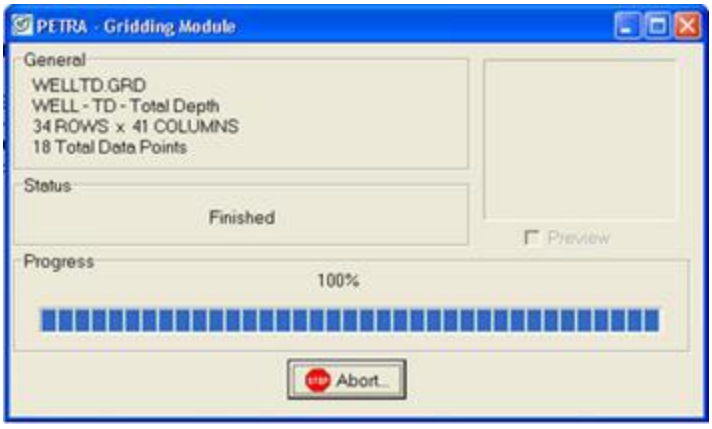
5. Click the **Estimate Grid Size From Z Data** radio button.



6. Click the **OK** button with the green check to initiate the gridding task.

Note: You may want to experiment by increasing or decreasing the grid size or using different surface style options.

Computing the grid for this small project won't take long. However, to accommodate larger projects, gridding is performed as a background job so you can continue doing other things during longer gridding tasks. This sample gridding screen was captured from an example with much more data. More than one gridding task can be active simultaneously. Once the gridding task completes, you are ready to display your contour map.



Structure map contouring

PETRA simplifies the contouring process and produces a reasonable map on the first try by computing default values for contour range and interval using grid file statistics. Most of the time you simply select a grid file and click OK to see the contours. However, there are several options for controlling contour range, interval, color scheme, and labeling style.

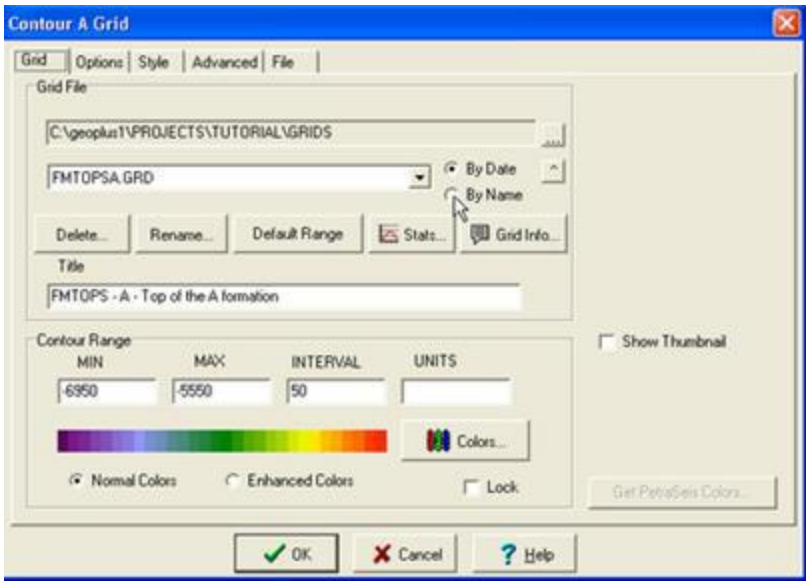
1. Invoke the contouring option by selecting the **Contours→Display Contours...** menu item

OR

by clicking the **Contour a Grid** icon.

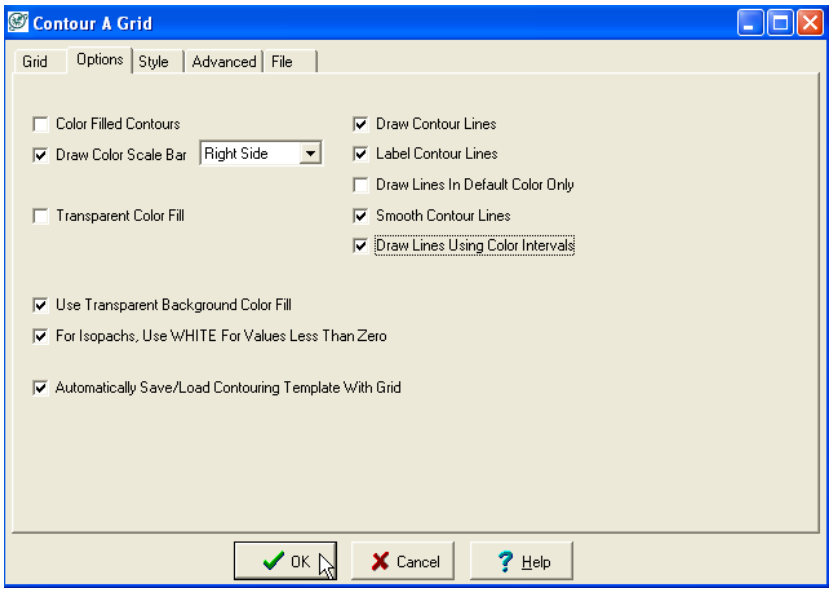
The Contour a Grid screen appears with the file FMTOPSA.GRD pre-selected. By default, Grids are listed in descending date order.

2. To sort the grid files by name, click the radio button to the left of **By Name**.

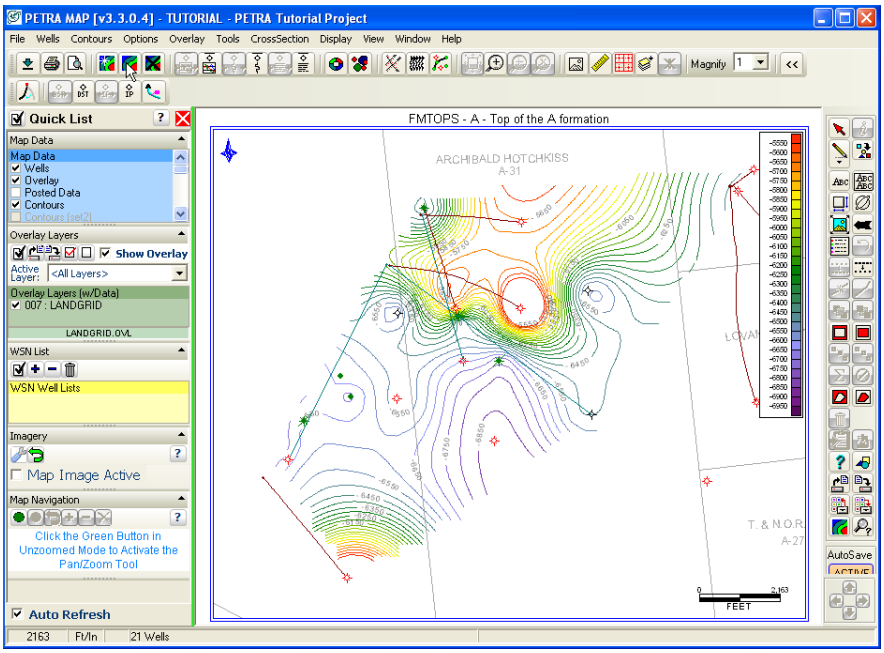


Note: Click the **Default Range** button to set the default contour range and interval.

3. Click the **Options** Tab to look at the available options. This tutorial uses the eight options that are checked at this time.



4. Click the **OK** button with the green check to display the contour map.



5. Select the **Contours→Display Contours...** menu item.

OR

Contour a Grid icon again.

6. This time, click the **Options** Tab, and then click the **Color Filled Contours** option so that it is checked.
7. Click the **Draw Color Bar Scale** option to display the color bar.
8. Click **OK** to see a color filled contour map with the color bar displayed on the map.

Contour range and color palette

To make changes

1. Again select the **Contours→Display Contours...** menu item.

   OR

   Contour a Grid icon.

   Note: Two options are available for editing/selecting colors: Normal Colors and Enhanced Colors. Both of these options select colors for display; however, Normal Colors may be a little simpler for new users. Select the Normal Colors option by clicking the radio button to the left of this option.

2. This time, click the **Colors** button on the Grid Tab screen.

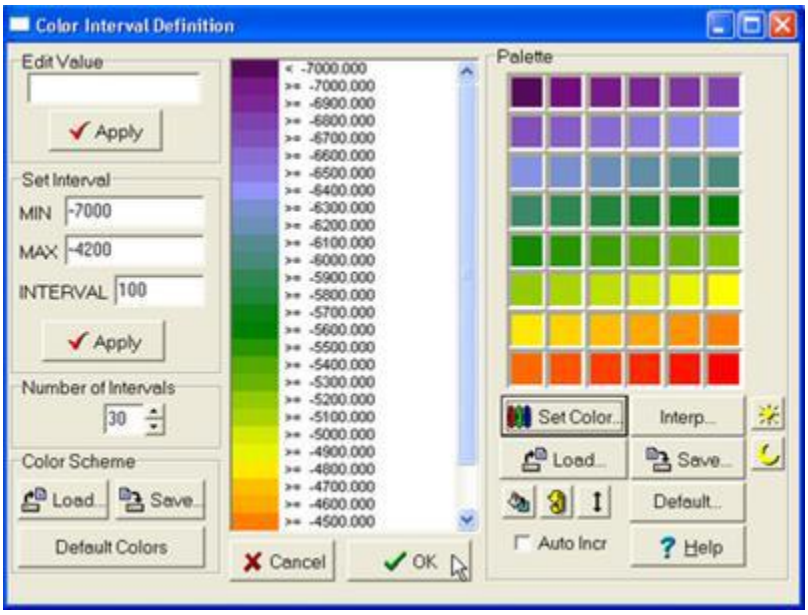
   PETRA displays the ***Color Interval Definition*** screen to select the color for each contour interval. The current color intervals are displayed in the center list.

3. To change an interval color, click once on its row in the interval list.

   Notice how the color palette indicates the current color.

4. Next, click once on a color palette cell to change the interval to a new color.

5. Click the **Help** button for many more features such as changing the number of color intervals, editing the color palette, and blending colors using interpolation.



6. Click the **OK** button with the green check to close this dialog screen.

   The changes that you have made are saved.

Contouring with faults

PETRA provides a very easy method to incorporate fault discontinuities into gridded surfaces. Faults can be added to a map using the Overlay feature, which is discussed in more detail in the *Map Overlay Utility* chapter. Read the *Adding an Overlay Line Editing Line Attributes* paragraph. In general, you can digitize faults from the screen as a series of points tracing the fault line or polygon. You then turn on the Include Faults option when the grid is created.

Creating an isopach

PETRA offers three methods for generating isopach contour maps. The first example below shows how to grid and contour the computed interval thickness at each well. The second example illustrates gridding the upper and lower structures of our formation, and then computing and contouring the difference between these surfaces. The third method uses the grid-to-grid calculation method. Methods two and three are similar; the difference between the two methods involves how you calculate the isopach.

Note: To display an isopach in the 3D Viz module, the grid must be derived by using method three of the aforementioned methods.

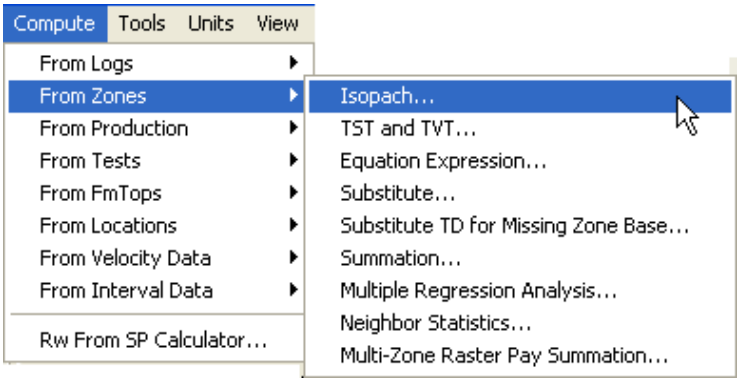
Computing isopach values at each well

To compute an Isopach for a Geologic Zone,

1. Compute the isopach at each well. Begin by defining a zone referencing the upper and lower formations as its depth intervals. Use the AB zone defined earlier in this tutorial which has tops A and B as its boundaries.
2. Switch back to the Main module by clicking the **Main - PETRA** button on the **Windows** task bar

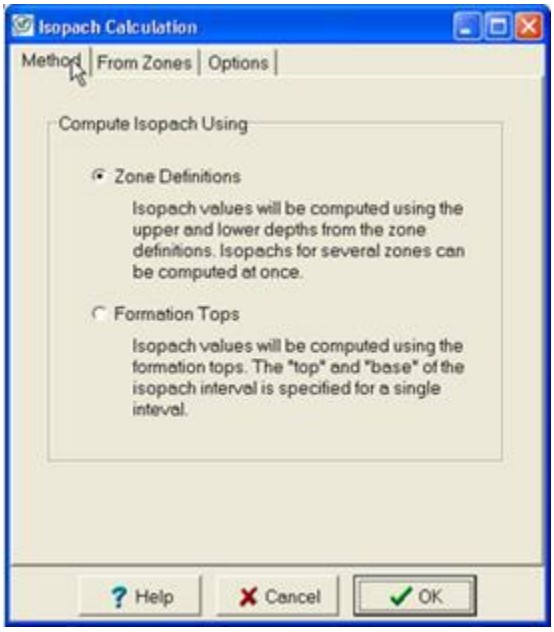
   OR

   selecting the **Window→Main** mapping menu at the top of the Map display.
3. Check that all wells are selected by viewing the Project Tab. If all wells are not selected, select the **Wells→Select→All Wells** menu or use the Crtl A hot keys.
4. Select the **Compute→From Zones→Isopach** menu.

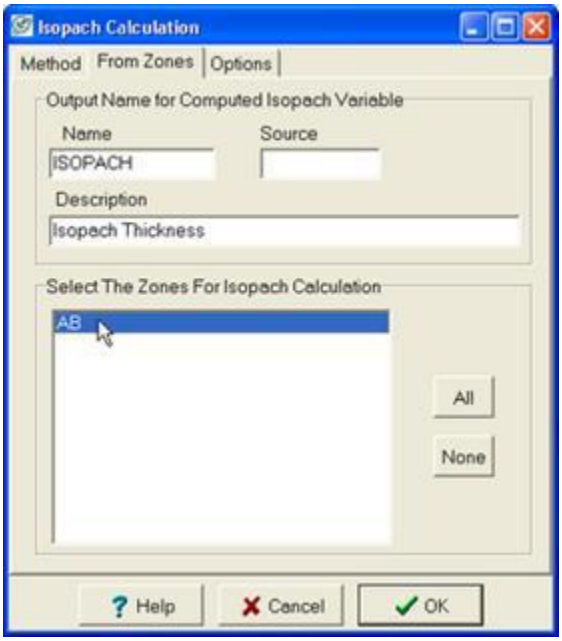


5. Click the **Method** tab.
6. Click the **Zone Definitions** radio button.

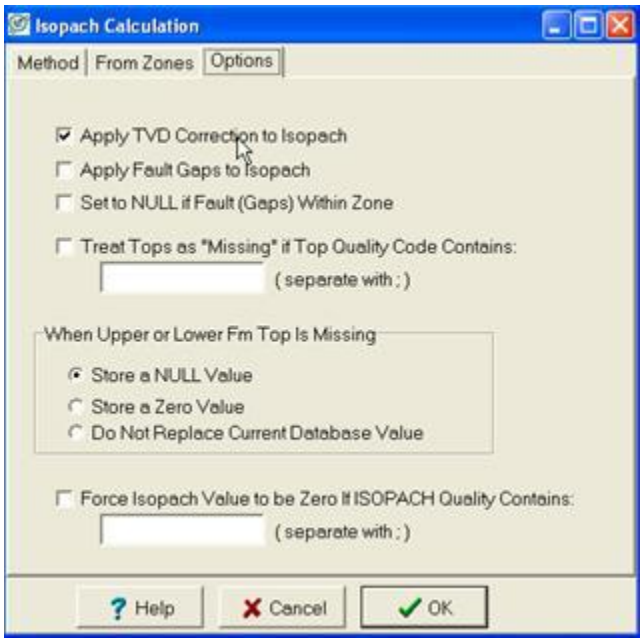
7. Click the **From Zones** Tab.


Isopach Calculation
Method
From Zones
Options
Compute Isopach Using
Zone Definitions
Isopach values will be computed using the upper and lower depths from the zone definitions. Isopachs for several zones can be computed at once.
Formation Tops
Isopach values will be computed using the formation tops. The "top" and "base" of the isopach interval is specified for a single interval.
Help
Cancel
OK

8. Highlight the **AB** zone name in the list box labeled **Select The Zones For Isopach Calculation**. Do not highlight other zones unless you wish to also compute isopach values for them. The default zone data name for the computed isopach values is ISOPACH.



Note: Since the TUTORIAL project contains deviated wells, you need to check the box to enable the **Apply TVD Correction To Isopach** option. This removes apparent thickness caused by the angled borehole. This is not the same as true stratigraphic thickness, which corrects for structural dip and azimuth.


Isopach Calculation
Method
From Zones
Options
Apply TVD Correction to Isopach
Apply Fault Gaps to Isopach
Set to NULL if Fault (Gaps) Within Zone
Treat Tops as "Missing" if Top Quality Code Contains:
(separate with ;)
When Upper or Lower Fm Top Is Missing
Store a NULL Value
Store a Zero Value
Do Not Replace Current Database Value
Force Isopach Value to be Zero If ISOPACH Quality Contains:
(separate with ;)
Help
Cancel
OK

9. Click the **OK** button with the green check to close this dialog screen.

   You see a confirmation message.

10. Click **OK.**

    The Isopach is computed.

11. Return to the Mapping module by clicking the **Map - PETRA** button on the Windows task bar.

OR

by clicking the **Mapping** icon.

You are now ready to create a grid of the isopach values.

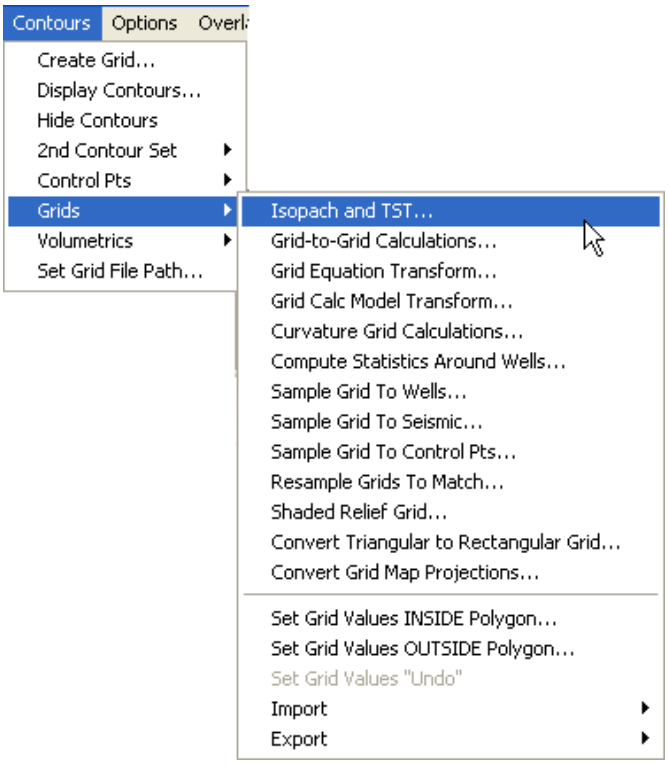
1. Invoke the **Contours→Create Grid** menu and select the **ISOPACH** variable of zone AB.
2. Click **OK** to start gridding.
3. When the grid task completes, select **Contours→Display Contours.**
4. Locate and select the grid file called **ISOPACH.GRD**, which is located at the top of the grid file list (grids are sorted in descending order by date).
5. Click **OK** to draw the isopach contours.

Isopach map from structure grids

The second method for constructing an isopach map of the AB interval involves creating two structure grids, one for formation A and one for formation B. You then subtract grid B from grid A to create a third grid, which contains the isopach values.

1. Begin by creating a grid of the formation B top following the same procedure used to create the structure grid for A. Don't forget to set the well symbol location depth to the B formation, using the **Wells→Directional Survey→Set Location Depth** menu.
2. After the B grid is generated, select the **Contours→Grids→Isopach and TST...** menu.

   This option performs mathematical operations between two grids.

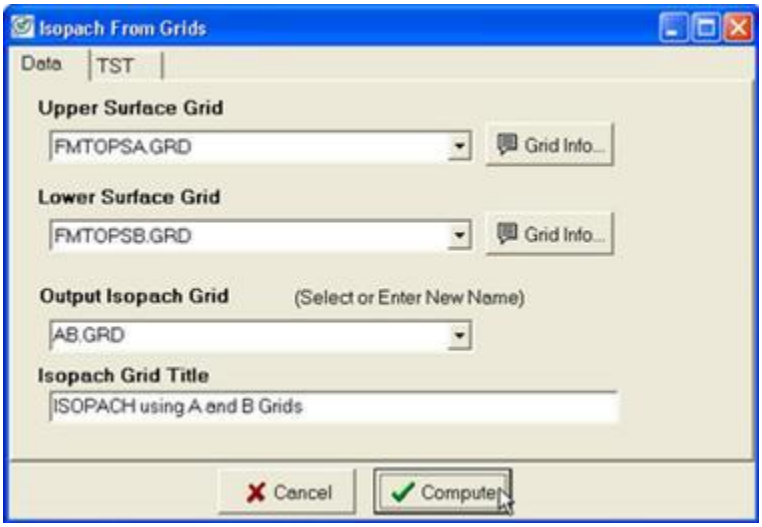


3. Use the drop-down list button in the Upper Surface Grid section to find and select the **FMTOPSA.GRD** file name.

4. Use the drop-down list button in the Lower Surface Grid section to find and select the **FMTOPSB.GRD** file name.

5. Enter the name **AB.GRD** in the **Output Isopach Grid** or use the drop-down list button to select an existing grid file that you want to overwrite.

6. Enter a grid title, such as **Isopach,** using A and B Grids.



7. Click the **Compute** button with the green check to compute the isopach.

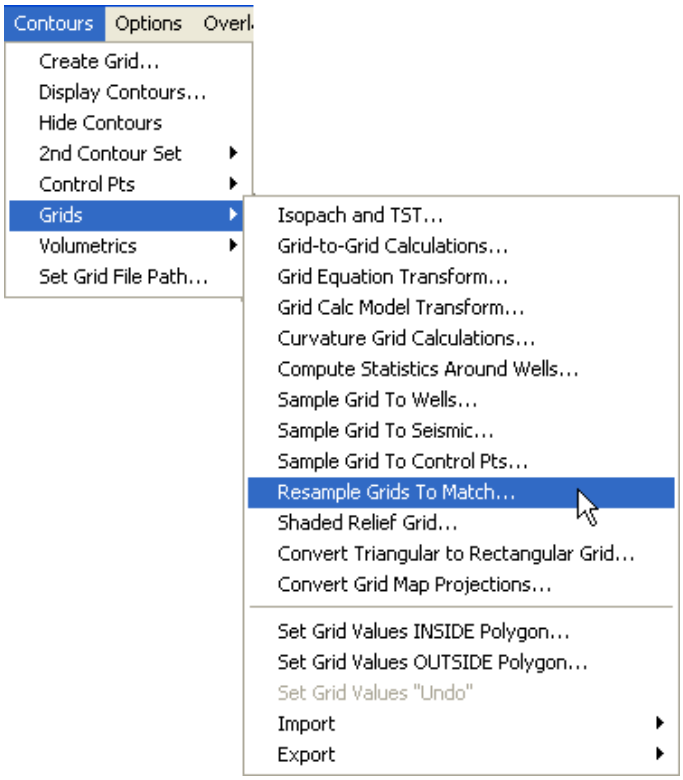
There is no correlation intended in naming the sample tops (A and B) and the two input grids (A and B).

The following message box is displayed confirming the Grid to Grid Option that was chosen and the grids that are to be used for A and B. The Output grid is shown as well. If the output grid file already exists, you get a message asking if you want to replace the existing grid file.

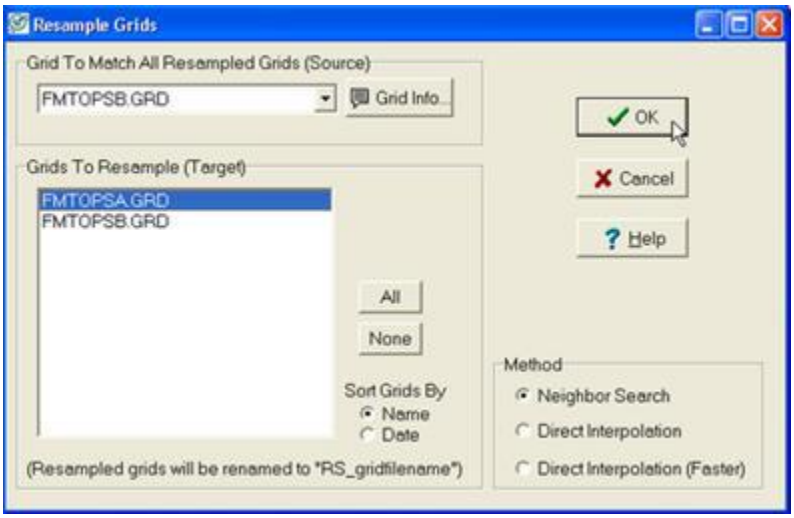
8. Click **Yes** if you want to replace the file.

The following message is displayed if the number of rows and columns are not the same for both grid files.

When this warning is displayed, use the **Contours→Grids→Resample Grids To Match…** menu option to resample the grid with the smallest number of rows and columns to the grid with the largest number of rows and columns.

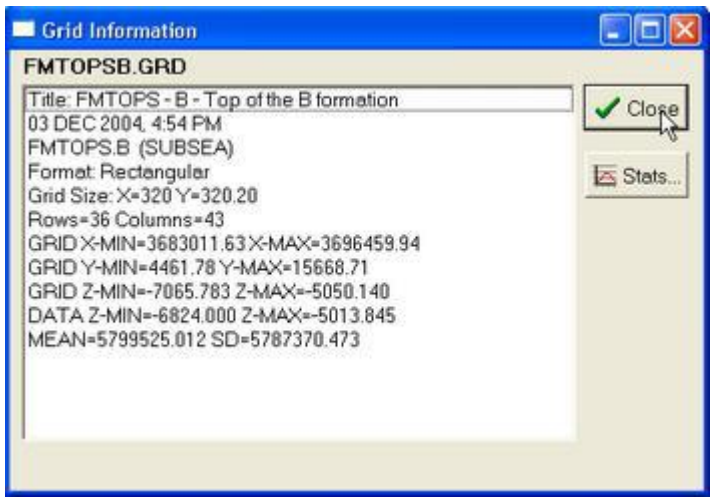


9. Click the drop-down list button to the right of the **Grid To Match All Resampled Grids** (Source) data field to select a grid file.



10. Click the **Grid Info...** button to display the information for that file.

11. Change the grid file to the **FMTOPSA.GRD** file to check the information for that file.



12. Click the **Close** button with the green check to close the ***Grid Information*** dialog screen.

Changing the grid file to check information

1. Change the grid file to the FMTOPSA.GRD file to check the information for that file.

   You want to select the grid file with the largest number of rows and columns as the Grid To Match All Resampled Grids (Source) grid file. The FMTOPSB.GRD file has the most

rows and columns. That file is used as the source file.

For the Grids To Resample (Target) file selection, select the grid(s) that you want to match the source grid by clicking on the grid file name(s). In this case, select the **FMTOPSA.GRD**, since we have selected the FMTOPSB.GRD as the source file.

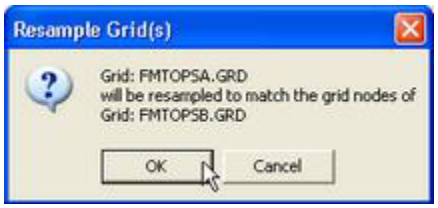
2. After you have selected the source and target grid files, click the **OK**

button with the green check.

   A Resample Grid(s) information screen is displayed.

3. Click **OK.**

   The resampled grids are renamed to RS_gridfilename.



   A RS_FMTOPSA.GRD file is created. Use that file to compute the AB Grid Isopach.

After completing the steps necessary to create the output grid that contains the **ISOPACH** using the **Grid To Grid** operation, display the resulting grid file **AB.GRD** using the **Contours→Display Contours** option.

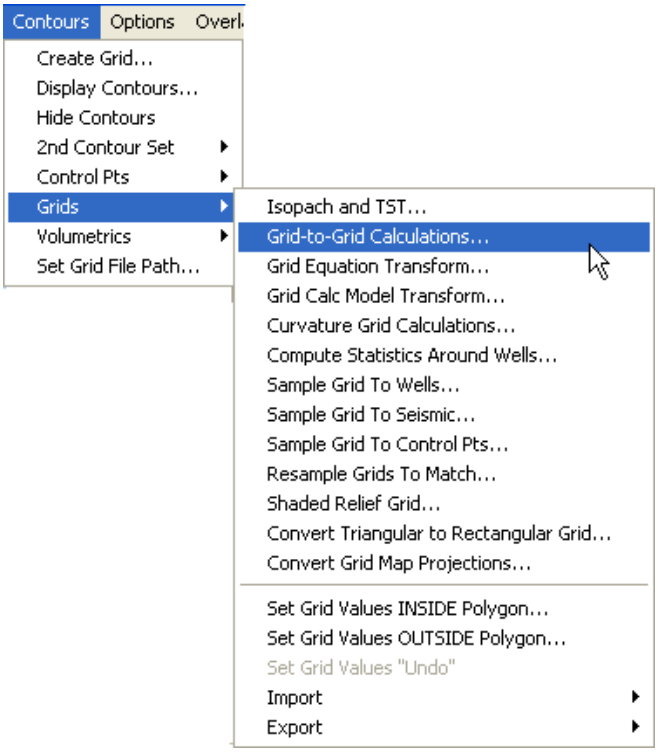
Isopach map from structure grids using the grid to grid calculations method

The third method for constructing an isopach map of the AB interval involves creating two structure grids, one for formation A and one for formation B. Then subtract grid B from grid A to create a third grid, which contains the isopach values.

1. Begin by creating a grid of formation B top following the same procedure used to create the structure grid for A. Don't forget to set the well symbol location depth to the B formation, using the **Wells→Directional Survey→Set Location Depth** menu.

2. After the B grid is generated, select the **Contours→Grids→Grid-To-Grid Calculations** menu.

   This option performs mathematical operations between two grids.



3. Enter the name **AB.GRD** in the **C** drop-down list box in the **Output Grid File** section.
4. Enter a grid title such as **Isopach** using A and B Grids.

5. Locate and select the Grid Operation entitled **C=A-B**. For the Input Grids section, select the **FMTOPSA.GRD** for the **A Input** grid file and **FMTOPSB.GRD** as the **B** input grid file.

6. Click **OK** to start the calculation.

   There is no correlation intended in naming the sample tops (A and B) and the two input grids (A and B).

   The following message box is displayed confirming the Grid to Grid Option that was chosen and the grids that are to be used for A and B. The Output grid is shown as well.

   You could possibly see the same warning message about the grids stating that they must have the same number of rows and columns as described above. Follow the same procedure as mentioned above to resample the grids to match.

Bubble Maps

Bubble maps display one or more z data variables as a color-filled circle or circle segment at each well. The radius of each circle can vary in size depending on the z value magnitude or can be a constant size for all wells. Bubble maps are ideal for displaying highly variable data such as cumulative oil and gas production. Bubble maps can also provide a good quality control tool to quickly show which wells have good values. For example, while correlating formation tops from cross sections, you might display the top you are picking as a fixed radius bubble map. You can easily keep track of which wells have not been picked and which cross sections need to be displayed.

1. If the contours from the previous example are still being displayed, click the

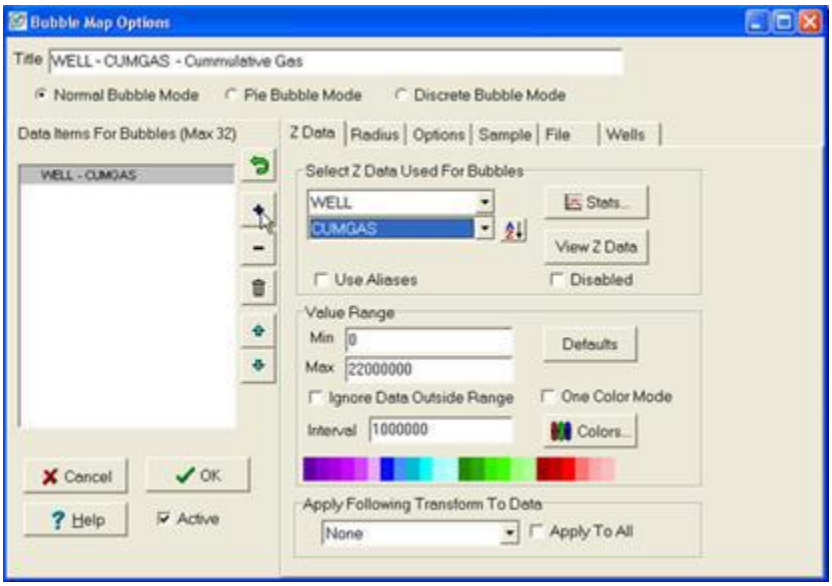
   Contours→Hide Contours menu or the **Hide Contours** icon to turn the contours off

   OR

2. You can click the check box to the left of Contours in the Quick List to turn off the contour display.

For this tutorial, the cumulative gas production we computed during the discussion on Main's Production tab is displayed. The values are stored in the WELL zone as an item name called CUMGAS.

1. Open the Bubble Map Options screen by selecting the **Map's Options→Bubble Map** menu or by clicking the **Bubble Map** icon.



The Bubble Map Options screen is divided into two sections. The Data Items For Bubbles (Max 32) list shows the item names currently selected for the bubble map. Each bubble can be composed of up to 32 segments from 32 different Z data items.

The right half of the screen consists of several tabbed sections used for data selection and parameter settings.

2. The cumulative gas production bubble map begins by locating and selecting the **CUMGAS** item of the WELL zone from the two drop-down list boxes within the **Select Z Data Used For Bubbles** section on the ***Z Data*** tab screen.

   Change the upper list box to the **WELL** zone.

   The lower list box shows all WELL zone data items.

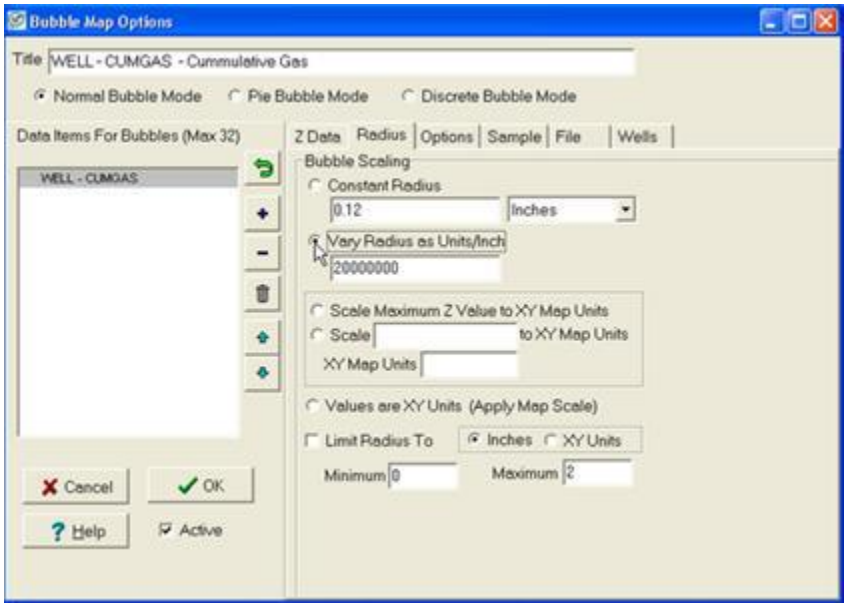
3. Locate and select the **CUMGAS** data item.

   Notice how the Value Range section adjusts to give appropriate default values.

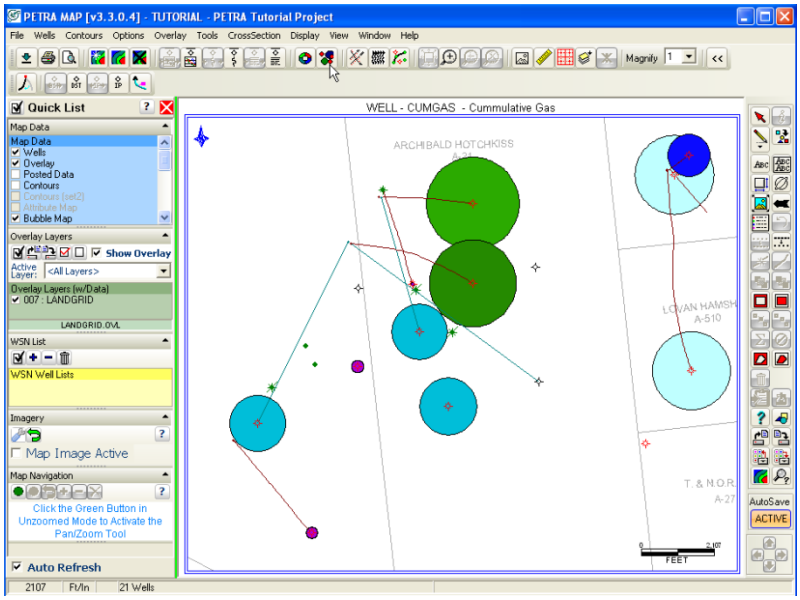
4. Click the **Colors** button to change the color scale and palette using the same technique described under contouring.

5. Click the **ADD Item To List** + button with the blue + to add the CUMGAS data item to the selection list.

6. Click the **Radius** tab and choose the **Vary Radius as Units/Inch** option by clicking the **Radio** button to the left of this option. Type a radius/inch value of 20000000.



7. Finally, click **OK** to draw the bubble map.



Map Overlay Utility

With respect to non well centric information, the map overlay utility provides the capability to create, import, edit, and display political and cultural data such as land grids and lease outlines. In general, the overlay utility allows arbitrary lines, text, and polygons to be added to maps. The overlay is composed of 256 user definable layers. Each layer can be displayed and manipulated independently. A layer contains one or more graphical element types. There are two basic graphical element types: lines and text.

The overlay utility also allows PETRA users to define geologic faults used for contour map construction. Contour maps can be captured to an overlay layer where contours can be modified and re-entered as control points to the gridding process.

The map overlay is similar to many drawing programs in that you can draw lines, text, and polygons on the map. PETRA extends these CAD-like features by recognizing faults and contour lines as special graphic elements.

The overlay data is stored in a binary file with an extension of .OVL. When the map is loaded, the data from the last overlay file is loaded into memory. Any changes that are made to the overlay are made in memory and must be saved to a .OVL file, otherwise the changes are not available when the overlay file is loaded the next time the Map module is activated.

Overlay toolbar

For simplicity, the overlay includes a toolbar which is activated from the Overlay→Show Toolbar menu. The overlay toolbar contains icons to manipulate overlay lines and text. A brief description is given for each icon:

Note: An option is available for capturing data from a map using a digitizing tablet. Please refer to the chapter *Capturing Data with a Digitizer* for configuring a digitizing tablet using a WinTab driver.

Select overlay line or text item.

Show/Modify attributes of the selected item.

Add a line, polygon, contour, or fault to the map.

Activates the Auto Set Polygon function. After clicking this button, then click inside an overlay polygon. The attributes (style) of the polygon is then set to predefined settings These predefined settings are set using the Overlay→Edit→Set Auto Set Polygon Attributes menu.

Add text to the map. Click three points. First point is the start of text baseline, second point is the end of text baseline, and third point indicates text size.

Add a text box by drawing a rectangle on the map. A text box contains multiple lines of horizontal text.

Add a box or rectangle to the map.

Add a circle or an ellipse to the map. Click once for center, then drag mouse to enlarge circle, then click to set the radius. Click the Circle or Ellipse radio button to define the circle or the ellipse.

Add an Image reference to plot a Windows metafile or bitmap file. Click and drag to draw a rectangle to define the position and size of the image.

Add an Arrow to the map. Click once at the start of arrow head, and then click again for arrow tail. Use the line attributes of area fill for a solid arrow. Use the Text tool to label the interior of the arrow.

Draws a legend box.

Rotates Line or Polygons. Uses a rotation angle in degrees counter-clockwise.

Smooth the selected line, contour, or fault by creating a new control point between each of the current control points.

Simplify the selected line, contour, or fault by reducing the number of control points making up the item.

Break a line, contour, or fault at the exact point where the item was selected.

Connect the selected line, fault, or contour to its nearest neighbor.

Change the plotting order of the selected item so that it plots on top of all others.

Change the plotting order of the selected item so that it plots behind of all others.

Clip all graphics items that fall inside a selected rectangle.

Clip all graphics items that fall outside a selected rectangle.

Delete one or more control points from the selected item. After selecting an item, click the left mouse button on one or more control points, and then click the right mouse button. The indicated control points are removed.

Add one or more control points to the selected item. After selecting an item, click the left mouse button between one or more control points, then click the right mouse button. New control points are added between the original points.

Display the area enclosed by the selected line.

Undo the last edit or deletion.

Clip all visible and non read only items inside of a user defined polygon. Click the left button to define the polygon. Click the right button when all points are defined.

Clip all visible and non-read only items outside of a user-defined polygon. Click the left button to define the polygon. Click the right button when all points are defined.

Delete the selected item.

Copy the selected item into the overlay clipboard function.

Paste the item from the overlay clipboard onto the screen.

Displays this help screen.

Display Layer & Preferences screen, which provides global editing options.

Imports an Overlay File from disk.

Saves the Overlay in memory to an overlay file on disk.

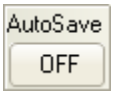
Loads a layer file from disk. A layer file contains a single layer exported from another overlay.

Saves (exports) a single layer to a layer file on disk.

Constructs filled polygons from a layer of contour lines.

Used to find and highlight a particular text string on the map.

Defaults to ACTIVE." The Overlay Auto Save feature enables you to have your current overlay files saved to a temporary file periodically during the session as one or more backup files.



When you click the **ACTIVE** button, this turns the Auto Save feature OFF. Click the **OFF** button to turn the feature back to ACTIVE.

After zooming, you can scroll left, right, up, or down.

Adding an overlay line

To add a line to the map,

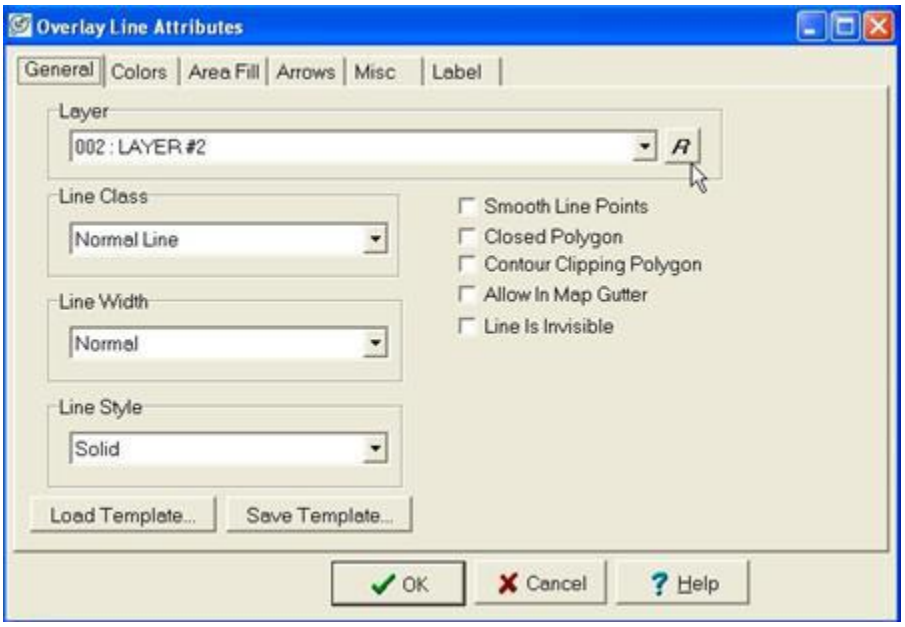
1. Click the **Draw Line** toolbar icon.

   The cursor changes to a cross-hair with a **?** mark to the lower right.

2. Position the mouse at the first point of the line and click the left mouse button.
3. Move the mouse to the next point to record.

   Notice the rubber band line connecting the previous point.
4. Repeat for all points making up the line.
5. After the last point, click the right mouse button to signal the end of digitizing.

   The Overlay Line Attributes dialog box appears.
6. Click the **Rename Layer** button to change the name of the layer to a more meaningful name instead of Layer # 2.
7. Define what class of line you want by clicking on the **Line Class** drop-down list button and selecting the desired line class from the available list.



Overlay line classes

The overlay line classes are

Normal Line - Normal lines include any line or polygon, smoothed or unsmoothed, filled, frame-filled, or unfilled. Polygons can be forced to have the first and last points closed. If you click the Closed Polygon check box, this forces the starting and ending points to match when drawing

polygons. This switch should be specified when using area fill options. The Contour Clipping Polygon is used to clip contours at the boundary of the polygon.

Contour Line - Contour lines have an associated Z value and use a special drawing and labeling algorithm. Contour lines can also be used as input to grid construction.

Unconformity Line - Unconformity lines are drawn as a wavy line. These lines are commonly used to illustrate an unconformable surface contact. Other properties of normal lines apply.

Fault Trace - Fault traces have special properties related to their effect on gridding.

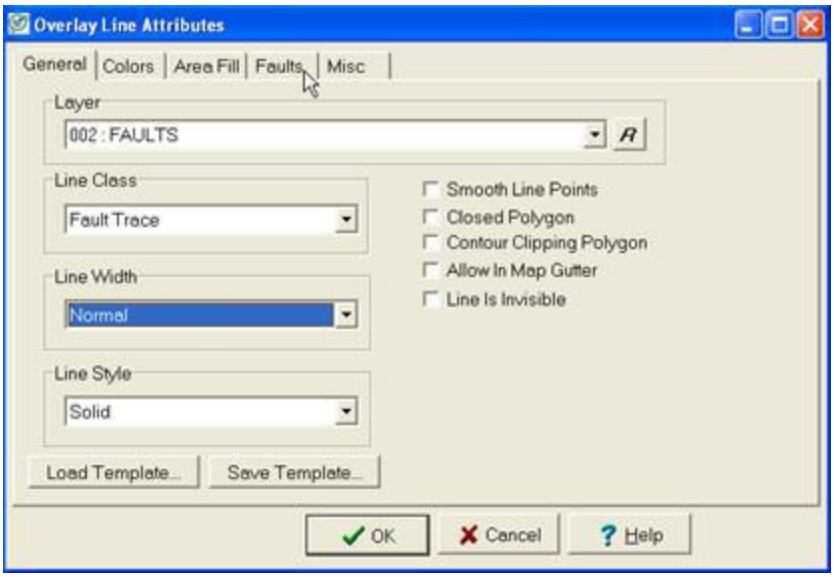
For this example,

1. Select **normal line**. You might select the **Smooth Item** icon to smooth the fault by adding extra data points. Do not use the Closed Polygon option for a fault.

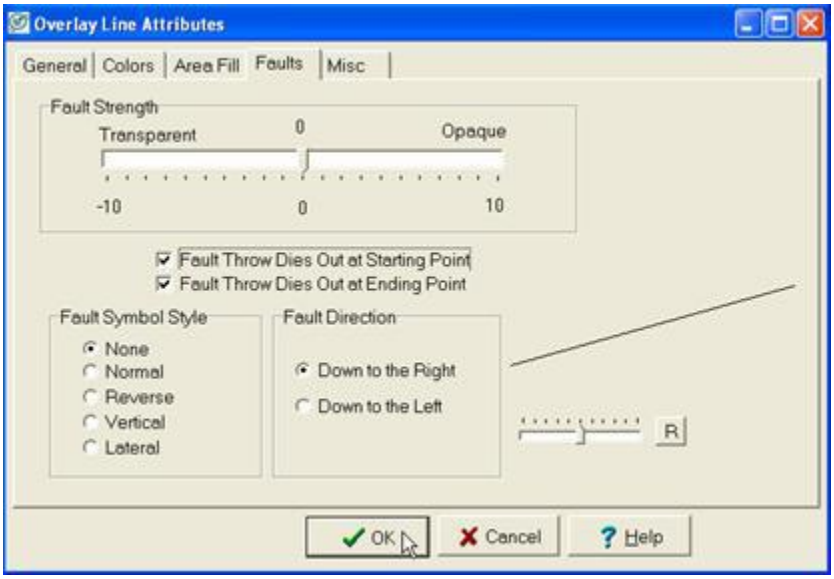
   Note: You must always start and end at the end of the fault, and the fault must be drawn clockwise. You cannot start in the middle of a fault.

   The end that is opposite from where you started must have a very sharp angle when you start down the other side of the fault.

   Do not use the Smooth Line Points, Closed Polygon, or Contour Clipping Polygon options. Instead, use the Smooth Item icon from the Overlay toolbar. After smoothing, you must make the end of the polygon go to a sharp angle by clicking on the point at the opposite end from where you started to draw the polygon and drag it out to make a sharp angle.

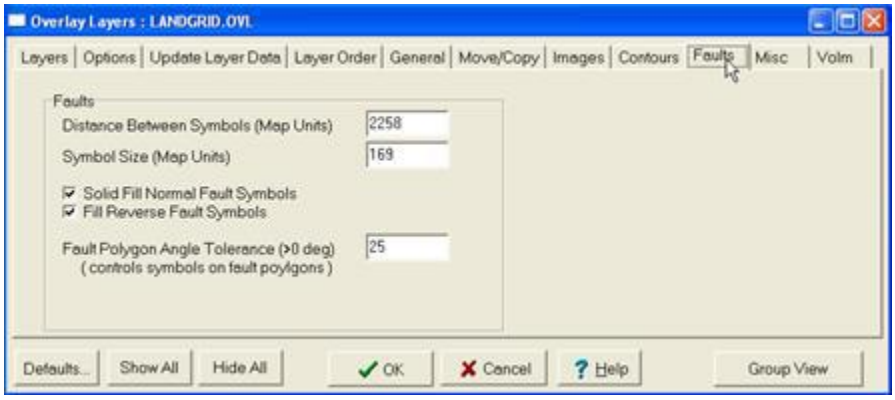


The following dialog screen shows the attributes that can be assigned to the fault.



2. To change the fault symbol size and distance between symbols, click the **Layers** icon on the overlay toolbar , or **Overlay Preferences & Layers** menu.
3. Click the **General** tab when the ***Overlay Layers*** dialog screen is displayed.
4. Change the Distance Between Symbols (Map Units) value to change the distance between fault symbols.

5. Change the Symbol Size (Map Units) to change the size of the fault symbols.



Editing line attributes

You can change the attributes of any overlay line after it has been added to the map:

1. Change the color of the line we added earlier, by clicking the **Overlay Select Item** icon on the overlay toolbar

   OR

   select the **Overlay→Edit→Select Item** menu, **Hot Keys Ctrl+e**.

   The cursor changes to a cross hair to indicate the active selection mode.

2. Position the cursor on the line and click once with the left mouse button.

   The line control points are drawn to show the line is selected.

3. Next, click the **Modify Attributes** icon on the overlay toolbar or the **Overlay→Edit→Modify Attributes** menu.

   The line attributes screen is displayed just as when you initially added the line to the map.

   You can now change any of the line's properties.

4. Click **OK** to redraw the map.

Note: A short cut to edit line attributes is to hold the Shift key down and double-click the left mouse button on the line or item that you want to select. This causes the line or item to be selected and the attributes dialog screen to be displayed.

Moving lines and line points

Entire lines can be moved from one location on the map to another using a drag technique. To move a line,

1. Select the line using the **Overlay Select Item** icon on the overlay toolbar or hold down the Shift key and Left Click the line.
2. With the cursor on the line, click and hold down the right mouse button and the Alt key on the keyboard at the same time. The Alt key may be released after the line is selected for movement.

   The line moves with the cursor until the right mouse button is released.

Instead of moving the entire line, you can also move individual line control points.

1. Select the line.
2. Click and hold down the left mouse button over a control point.

   The control point moves with the cursor until the left mouse button is released.
3. Adjust the location of as many points on the line as needed, and then click the right mouse button or the **map redraw** icon located at the top of the map module to redraw the screen.
4. Using the Left Mouse button, single-click while holding down the Shift+Ctrl keys to select multiple overlay line or text items.
5. After selecting the multiple items, hold down the Alt key and right click to move all of the selected items.

Adding overlay text

To add a label or text string to the map,

1. Click the **Add Text** icon.

2. Click the left mouse button on the base line point defining the starting location of the text string.
3. Move the mouse and click again to pick the ending base line point.
4. Move the cursor upward to adjust the text box height.
5. Click a third time to select the height and display the Overlay Text Attributes dialog box.
6. Enter the text string, select the layer, where the text is to be stored, the text color, the justification, the desired font, and make any adjustments that may be needed to the text height and text angle in degrees.

Editing text attributes

Like lines, overlay text attributes can be modified. You can change height, color, text angle in degrees, the justification of the text, the font, set an opaque background, specify an option to allow the text to be plotted in the map gutter, or even the text string itself. The text must first be selected before it can be modified.

1. Select a text item by first clicking the overlay toolbar **Overlay Select Item** icon.
2. Click the left mouse on the text to be modified. The selected text is indicated by a box around the text and control points along the base line.
3. Click the **Modify Attributes** icon on the Overlay toolbar or the **Overlay→Edit→Modify Attributes** menu.
4. Change the text information, and then click **OK**.

Note: You can also invoke the text attributes dialog box by holding the Shift key down and double-clicking the left mouse button on the text item that you want to select.

Moving text

Text can be moved from one location to another or rotated. To move text,

1. Select the text as described above, and then click and hold the right mouse button and the Alt key on the keyboard at the same time.

   After the text is selected, the Alt key may be released. You can move the text while holding the right mouse button down.

2. After the text is positioned where you want it, release the right mouse button.
3. Selected text can be rotated by selecting a text item by first clicking the overlay toolbar **Overlay Select Item** icon.
4. Click the left mouse on the text to be modified.

   The selected text is indicated by a box around the text and control points along the base line.

5. Click the **Modify Attributes** icon on the **Overlay t**oolbar or the **Overlay→Edit→Modify Attributes** menu.
6. Change the **Text Angle** in Degrees information, and then click **OK**.

Note: You can also invoke the text attributes dialog box by holding the Shift key down and double-clicking the left mouse button on the text item that you want to select.

Capturing Data with a Digitizer

The following sections describe how to capture data with a digitizer.

Note: PETRA does not have to be running when you establish communication between the PC and the digitizing tablet. You can move the digitizing cursor on the tablet and see the screen pointer move. If you do not see the screen pointer move,

- Check the power to the tablet.
- Make sure the tablet is connected to the PC.
- Make sure that the power is turned on for the tablet.
- Make sure that the cursor for the digitizer is plugged in.
- Make sure that the WinTab driver was installed correctly.

When you have communication between the PC and the digitizing tablet, you are ready to begin the process to capture data into PETRA.

Map Overlay UtilityAdding Overlay Text – Map Overlay Utility

This tutorial uses the Tutorial project database, which is installed with the PETRA program files. The Tutorial project contains all data referenced by this manual.

The map overlay utility provides the capability to create, import, edit and display political and cultural data, such as land grids and lease outlines. In general, the overlay utility allows arbitrary lines, text, and polygons to be added to maps. The overlay is composed of 256 user definable layers. You can display and manipulate each layer independently. A layer contains one or more graphical element types. There are two basic graphical element types: Lines and Text.

The overlay utility also allows PETRA users to define geologic faults used for contour map construction. Contour maps can be captured to an overlay layer where contours can be modified and re-entered as control points to the gridding process.

The map overlay is similar to many drawing programs in that you can draw lines, add text, and polygons on the map. PETRA extends these cad-like features by recognizing faults and contour lines as special graphic elements.

PETRA provides the option to input lines, text, faults, etc., using a Wintab compliant digitizing tablet. You will first need to install the Wintab driver for your tablet and operating system. If you do not have a Wintab driver, you need to download one from the web site for your plotter. The tablet used in this manual is a SummaSketch® III Professional, 12 inches high by 18 inches wide. The web address for this tablet is: http://www.calcomp.com/support.htm. The following procedure was used to download and install the tablet driver:

On the GTCO CalComp web site, we selected the Summagrahics digitizers and graphics tablets option. That took us to another page with a Digitizers and Graphics Tablets and a Driver & Software Downloads option. We selected the appropriate driver for our tablet and operating system. The file was called TW-10.03.0004.exe. We downloaded that file and went through the installation procedure.

You will go through the same kind of procedure for your digitizing tablet.

Using a Wintab Driver and a Digitizer Tablet

Options are available for capturing Line data, Wells, and Seismic Lines into the map overlay from a paper map using a digitizer tablet. The Wintab driver, available through your tablet vendor, is used to communicate with the digitizing tablet. After obtaining and installing the Wintab driver and connecting the tablet to the PC, you can capture Line data, Wells, and Seismic Lines from the tablet into PETRA.

Note: We do not recommend using the Stylus or Pen when using a digitizer tablet to capture data as they are very difficult to configure for the Left and Right Click data capture

mode. PETRA uses two buttons on the tablet mouse for capturing the data from the digitizing tablet. Since there are only two buttons being used, you can use a four button mouse or the sixteen button mouse that comes with your digitizer. You use the two buttons that you assign for **Left Click** and **Right Click**.

Comment About Registering the Digitizing Tablet

After you have the Wintab driver installed, open the Map module and print a map with the landgrid displayed from the Tutorial project. Remove the printed map from the printer, and tape the map to the digitizing tablet.

Note: If you printed a zoomed in area, you will need to set the limits for the map to the zoomed area. If you don't, you will not see the digitizing cursor on the map when you start the digitizing process even though you go through the calibration steps.

To set the limits for a zoomed in area,

1. Click the **Display>Data Limits>Set/Enter Limits…** menu.
2. Click **Set Limits** from **XYs** button.

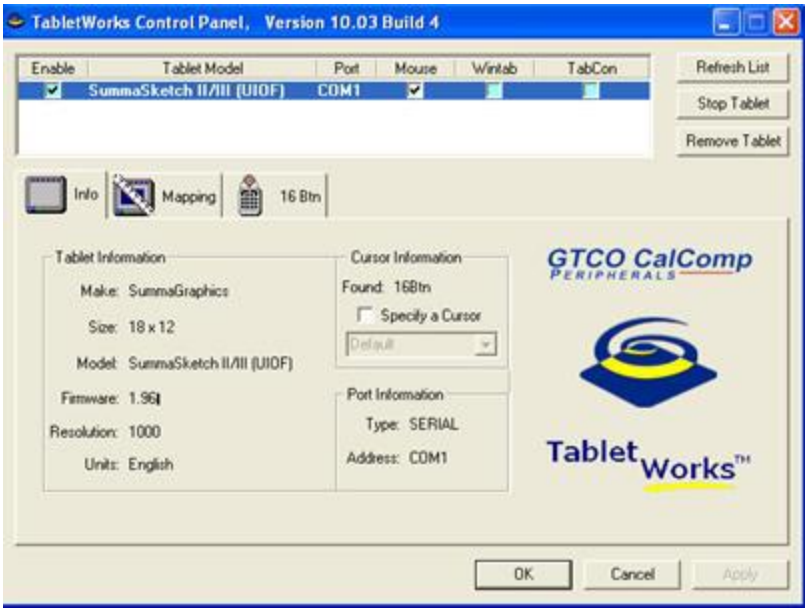
   If you want to return back to these limits again, save the limits by clicking the **Display>Data Limits>Save Limits…** menu.

   When you want to return to these limits, click the **Display>Data Border Gap…** menu.
3. Click the **Check box** to the left of **Active** if there is a check in the box. If the box is empty, just click the **Cancel** button, as the option is not active.
4. Click the **Display>Data Limits>Load Limits…** menu.
5. Double click the name of the file that was entered when the limits were saved.

Configuring the Wintab Driver

The settings that are shown below are for TabletWorks v10.0 using a SummaSketch III Professional 18 by 12 tablet with a 16 button Mouse (Cursor).

The dialog screen below shows the information obtained from the tablet after the driver was installed and the TabletWorks Control Panel was opened. The screen shown below shows the data on the Info Tab and the tablet that is connected to COM1.

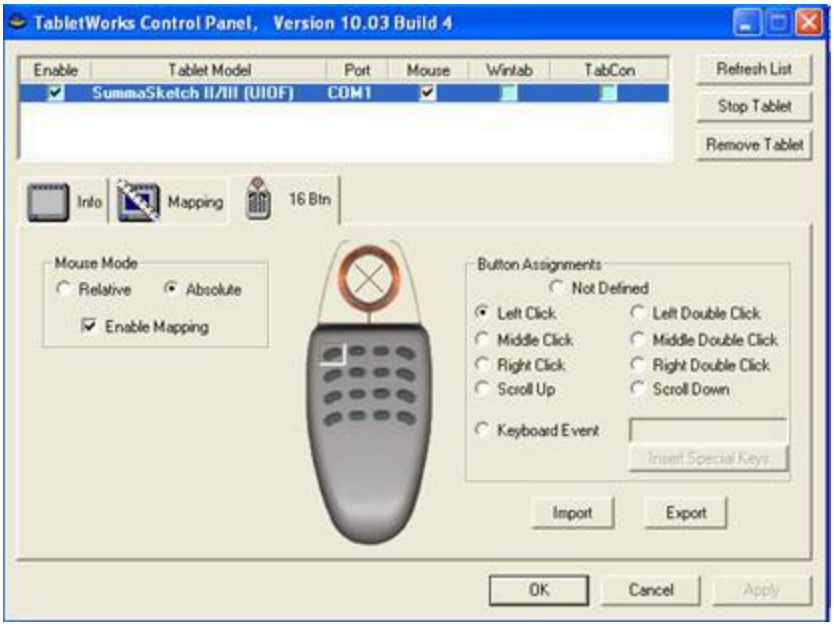


PETRA requires two buttons to be set: 3 for left click and 1 for right click.

To use to capture data when using the Tablet Mouse, you can click one of two buttons.

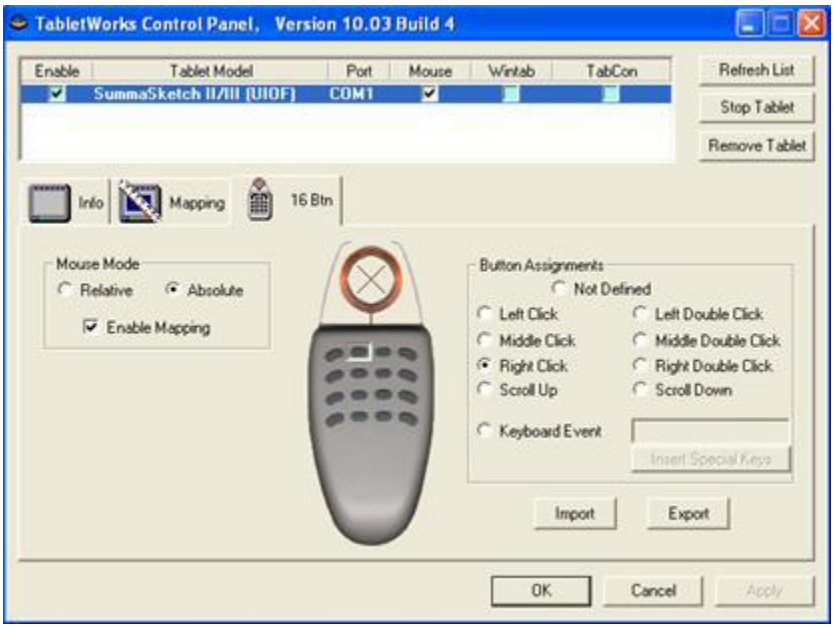
1. Click the 16Btn tab.
2. Click Button 1.

   It should be set to Left Click under the Button Assignments. If it is not set to Left Click, click the radio button to the left of the **Left Click** option.



3. Click Button 2.

   It should be set to Right Click under the Button Assignments. If it is not set to Right Click, click the radio button to the left of the **Right Click** option.



4. If the **Apply** button is not greyed out, click it to apply the changes. If there were not any changes, the Apply button is greyed out.

When the Wintab driver is configured, and you have communication between the PC and the digitizing tablet, you are ready to begin the process to capture data into PETRA.

When you move the mouse on the digitizing tablet, the cursor on the screen should move. If it does not move around the screen as you move the mouse around the tablet, the tablet has not been configured properly or is not turned on.

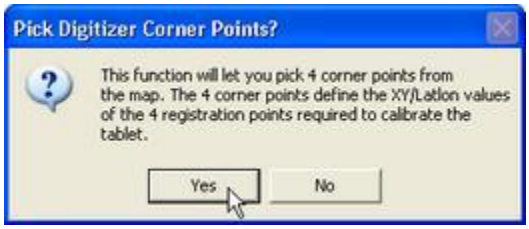
Tablet Registration Instructions

To register the tablet,

1. Click the **Overlay Menu** at the top of the Mapping Module Screen.

   The menu items for the Overlay are displayed.

2. Click the **DigitizingTablet (Wintab)→ Pick Corner Pts From Map** option.


Pick Digitizer Corner Points?
This function will let you pick 4 corner points from the map. The 4 corner points define the XY/Latlon values of the 4 registration points required to calibrate the tablet.
Yes
No

3. Click the **Yes** button.
4. Four registration corner points must be selected from the map on your PC screen that will correspond to four registration corner points on the map that is on the digitizing tablet. Capture these points clockwise, starting with the lower left registration point.
5. Select the lower left registration point on the PC screen that corresponds to the lower left registration point on the map and is on the digitizing tablet.

There are a couple of keys that you can use to Snap to a Well or a Control Node on an Overlay Line, such as a Section Corner.

- The F1 function key snaps to a Well.
- The F2 function key snaps to a control node.
- The F3 function key snaps to the nearest quarter section grid intersection if the Quarter Section Grid is turned on.

Note: The following procedure uses the PC mouse to capture the map corner points from the screen.

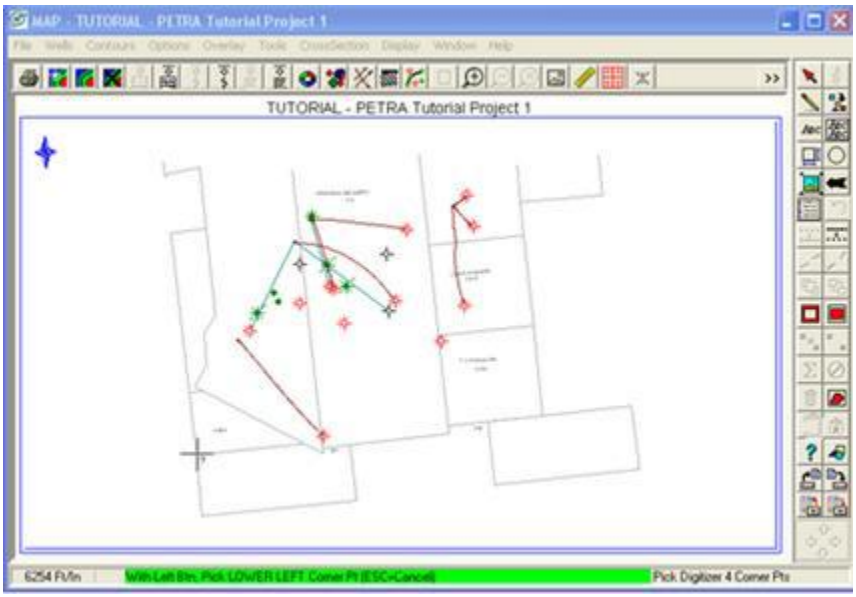
1. With the PC Mouse, select the lower left registration corner point. If you want to use the Snap feature, move the mouse close to the Well or Control Node, **remove your hand from the PC Mouse,** and then press the **F1** or **F2** function key to snap to the Well or Control Node.

   You see the cursor snap to the Well or Control Node.

2. Now press the **Enter** key to capture the coordinates for the lower left registration point.

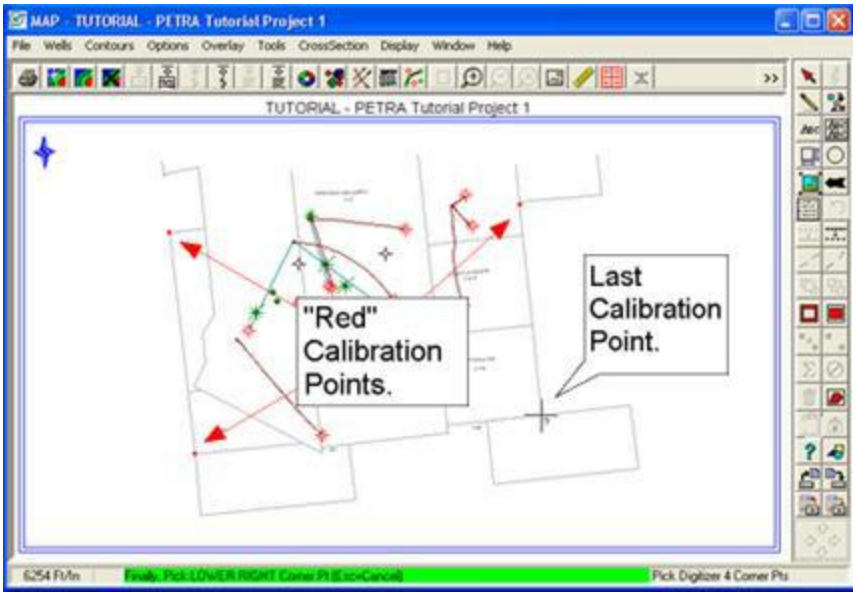
   You see a red dot placed where the registration point was picked.

3. Follow this procedure for the upper left, upper right, and lower right registration points.



The graphic shows capturing the last corner point.

Note: The red dots show the locations where the registration points are taken.)


MAP - TUTORIAL - PETRA Tutorial Project 1
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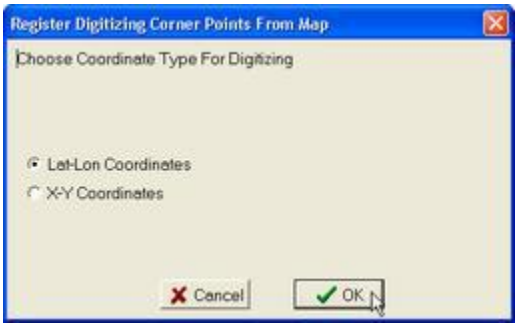
TUTORIAL - PETRA Tutorial Project 1
"Red" Calibration Points.
Last Calibration Point.
Pick Digitizer 4 Corner Pts

After capturing the fourth and last registration point, the following dialog screen is displayed.



1. Choose the Coordinate Type to be captured while digitizing, and then click the **OK** button with the green check on it. (For this discussion, use the Lat-Lon Coordinates option.)

   An Information box is displayed.

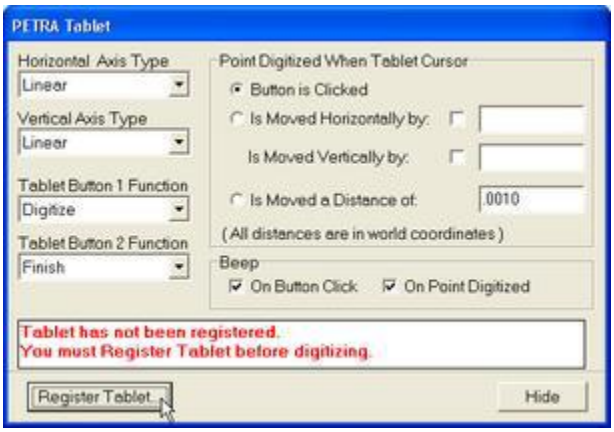
2. Click the **OK** button to continue.

Information
Map corner points have been set. You should now calibrate these points with 4 points on the tablet using the "Register Tablet" function
OK

A dialog screen is displayed.

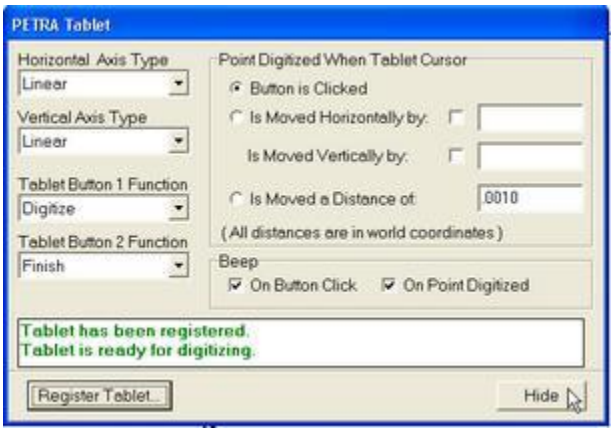
3. If you click the **PETRA Tablet** icon

on the Quick Launch tool bar at the bottom of the screen, you see the dialog screen entitled ***PETRA Tablet***.



4. Click the **Hide** button.

   This places the icon back on the Quick Launch tool bar at the bottom of the screen.



5. Verify the following settings:

   - Horizontal and Vertical Axis Types should be set to Linear.
   - Tablet Button 1 Function should be set to Digitize.
   - Tablet Button 2 Function should be set to Finish.

On the right side of ***PETRA Tablet*** dialog screen, there are two sections. The upper section is called **Point Digitized When Tablet Cursor** and the lower section is called **Beep.**

The **Point Digitized When Tablet Cursor** section has three options available for capturing data from the tablet.

- **Button is Clicked** is an option to capture data every time the **Left Click** button is used. This is the default option. This option is sometimes referred to as Point or Point to Point mode when digitizing.
- **Is Moved Horizontally by:** and **Is Moved Vertically by:** is an option to capture data after the **Left Click** button is clicked to anchor the starting point of the line and the tablet cursor is moved a specified distance either horizontally or vertically, or if both conditions are met. This option is sometimes referred to as Stream mode. You can capture data in Stream mode using this option or option 3, **Is Moved a Distance of:** as mentioned below.
- **Is Moved a Distance of:** is an option to capture data after the **Left Click** button is clicked to anchor the starting point of the line and the tablet cursor is moved the specified distance. Remember to make sure the value represents the coordinates that you specified on the ***Register Digitizing Corner Points From Map*** dialog screen.

  There were two choices, Lat-Lon Coordinates and X-Y Coordinates. If the choice was Lat-Lon Coordinates, the value for the option, **Is Moved a Distance of:**, is something like 0.0010. If there are too many points being taken, change the **Is Moved a Distance of:** value to a larger number, for instance 0.0020. This change captures about half as many points for a line that is the same length. This option also is sometimes referred to as Stream mode. You can capture data in Stream mode using this option or option 2, **Is Moved Horizontally by:** as mentioned above.

The Beep section has two options that can be set to cause a beep sound.

- The first is **On Button Click** to enable the beep when you click the left button on the digitizing mouse.
- The second is **On Point Digitized** to enable the beep when a point is digitized when you are in the **Is Moved Horizontally or Vertically** mode or the **Is Moved a Distance of mode**.

There is an information box at the bottom of the screen that tells you if the tablet has already been registered or if the tablet has not been registered.

Note: If the map has been moved, you will still need to register the tablet even though the message indicates that the tablet has been registered.

1. Click the **Register Tablet…** button

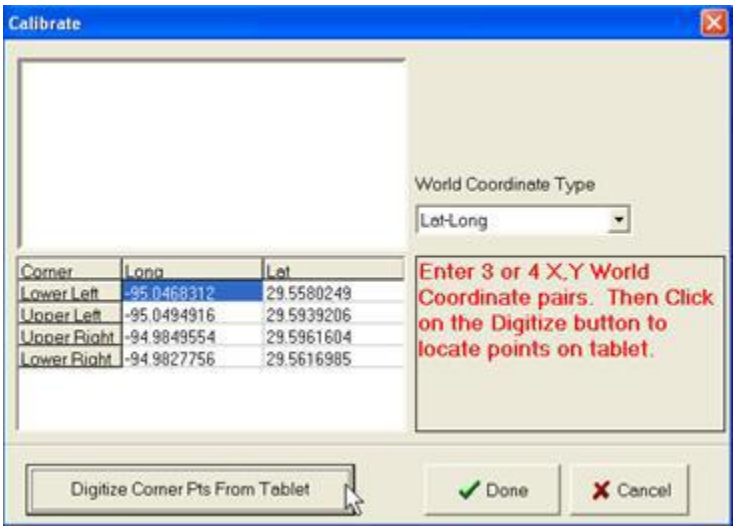
that is displayed at the bottom of the ***PETRA Table*** dialog screen.

Note: If you see the following warning dialog screen, close the Map and re-open again. The communication to the digitizing tablet was lost.

The Calibrate dialog screen that is shown below, is displayed. Notice the four corner points that were captured on the Map have been entered as decimal degrees, since that was the option chosen earlier.

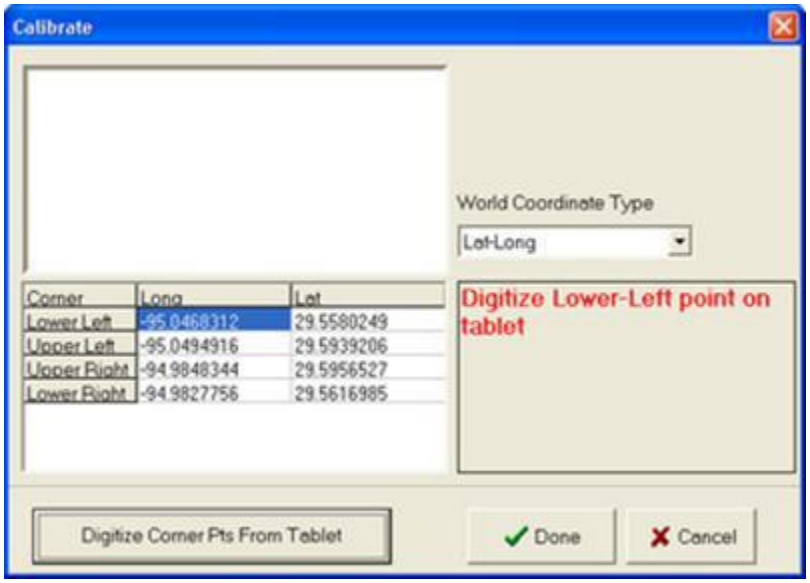
2. Click on the **Digitize Corner Pts From Tablet** button.

Note: You may hand enter the four corner points on this screen, instead of capturing them from the PC Screen if you know the coordinates for the four corner points. The hand entered coordinates may not be as accurate as actually capturing them with the Snap feature mentioned above. The points shown below were captured from the map on the screen.


Calibrate
World Coordinate Type
Lat-Long
Corner Long Lat
Lower Left -95.0468312 29.5580249
Upper Left -95.0494916 29.5939206
Upper Right -94.9849554 29.5961604
Lower Right -94.9827756 29.5616985
Enter 3 or 4 X,Y World Coordinate pairs. Then Click on the Digitize button to locate points on tablet.
Digitize Corner Pts From Tablet
Done
Cancel

After you click on the **Digitize Corner Pts From Tablet** button, a Digitize Lower-Left

point on tablet prompt is displayed on the right side of the ***Calibrate*** dialog screen.

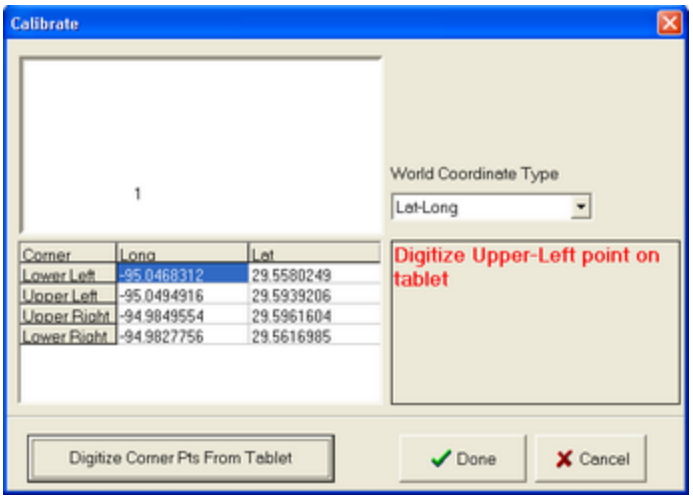


3. **Using the Digitizing Mouse,** position the tablet mouse cross hairs over the registration point on the map that is on the digitizing tablet. This point must correspond to the lower left registration point that was captured on the PC map.

   Note: You will not see the cross hairs track on the PC Screen.

4. Press the button on the tablet mouse that was set up as the **Left Click** button.

   You see A 1 in the ***Calibrate*** dialog screen data window, and the instructions change to **Digitize Upper-Left point on tablet**.



Note: If you do not see the 1 appear, the button that you are using may not be the one that was set up as the Left Click button. If the ***Calibrate*** dialog screen drops down to the Quick Launch Tool Bar, the button that you are using for the Left Click may be the Right Click button instead. Verify the settings for the Tablet Mouse using the TabletWorks icon in the Icon tray located on the lower right side of the screen

. The icon for TabletWorks looks like this:

Note: If the tablet is not connected to the PC, the icon for TabletWorks in the Quick Launch Icon Tray has a red **X** on the icon to show that the tablet is not connected: Review the Configuring the Wintab Driver section for more information.

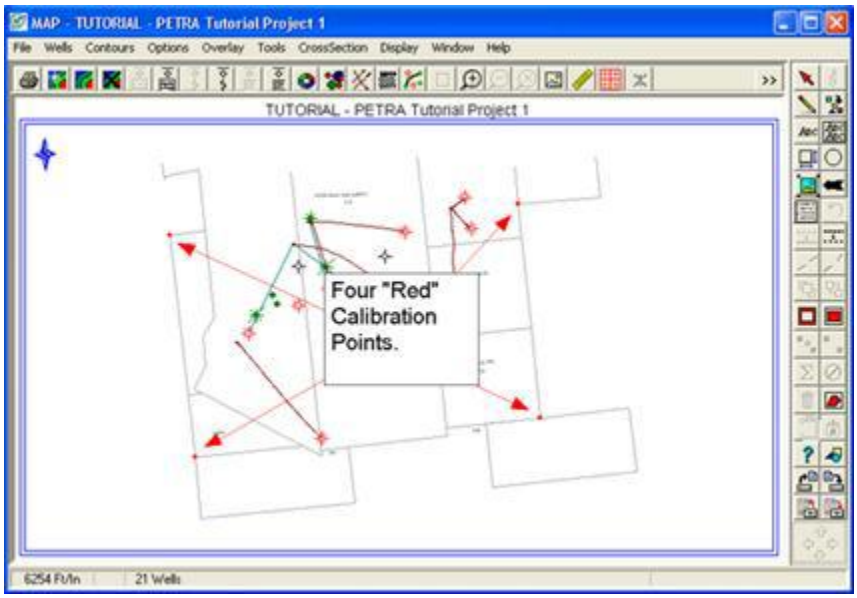
5. Move the Digitizing cursor cross hairs to the registration point on the digitizing tablet map that corresponds to the upper left registration point on your PC map. Press the button on the tablet mouse that was set up as the **Left Click** button.

6. Continue this procedure for the Upper-Right and the Lower-Right points.

   The Calibrate dialog screen drops down to the Quick Launch Tool Bar at the bottom of the screen. The examples shown are for XP.

The complete Task Bar, for XP, is shown below:

The four calibration points are shown as red dots after calibration.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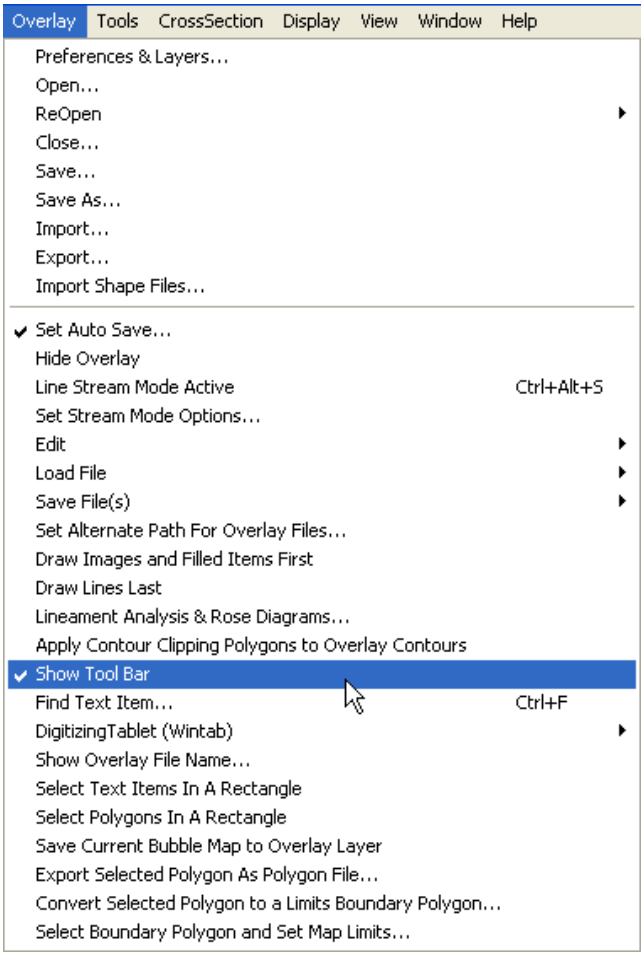
TUTORIAL - PETRA Tutorial Project 1
Four "Red" Calibration Points.
6254 Ft/in
21 Wells

This process stays active until you click the **Overlay Menu** and select the **Disabled** option. **Overlay→DigitizingTablet (Wintab)→Disabled.**

Calibration Verification

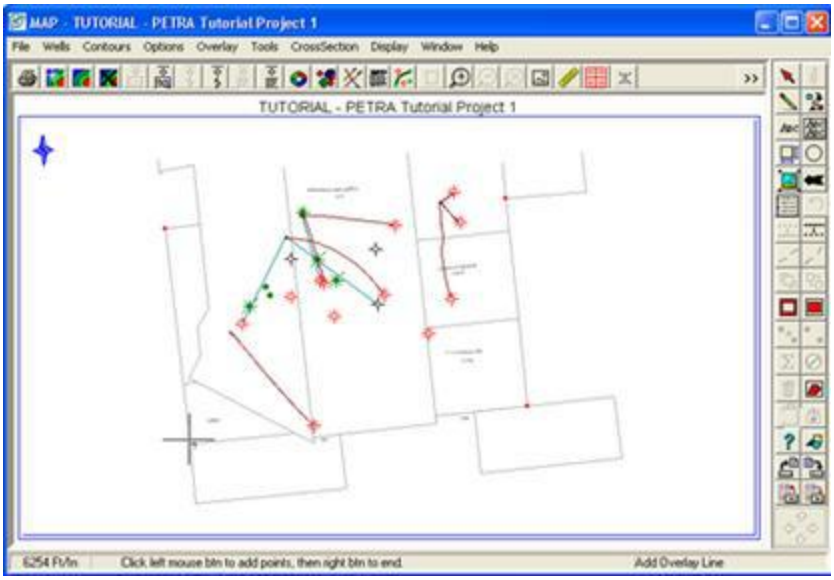
If the Overlay Tool Bar is not displayed on the right side of the map, click the **Overlay>Show Tool Bar** menu.



The toolbar that is displayed below is shown on the right side of the map.

Click the **Pencil** icon that is displayed in **Draw Line** when the cursor is placed over the icon. Use the digitizing mouse to move to the lower left calibration point. You should see the large cursors with the **?** mark on it move to the lower left Red calibration point on the PC screen.

The windows displayed below show the large cursor tracked to the lower left calibration point.


MAP - TUTORIAL - PETRA Tutorial Project 1
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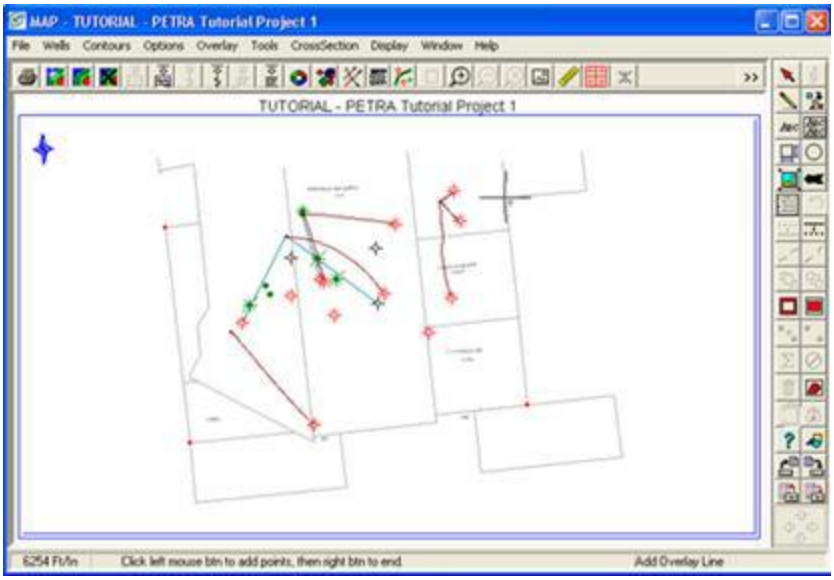
TUTORIAL - PETRA Tutorial Project 1
6254 Ft/In
Click left mouse btn to add points, then right btn to end
Add Overlay Line


MAP - TUTORIAL - PETRA Tutorial Project 1
File Wells Contours Options Overlay Tools CrossSection Display Window Help
TUTORIAL - PETRA Tutorial Project 1
6254 Ft/In
Click left mouse btn to add points, then right btn to end
Add Overlay Line

If the cursor does not track to the four calibration points, you need to double check the calibration process.

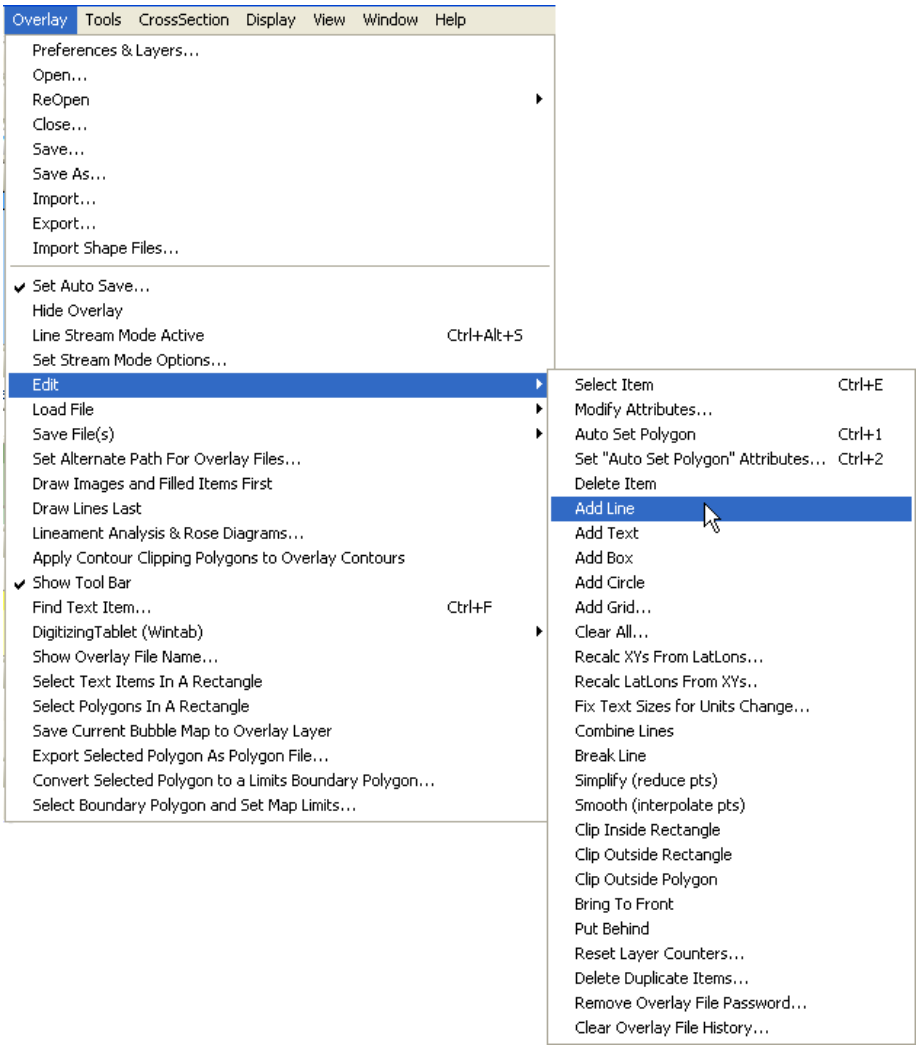
Note: You can click the **Esc** key on the keyboard to abort the drawing of a line in the Map module.

Capturing Line Data with a Digitizer

PETRA can capture line data directly into the overlay from a digitizing tablet. The tablet must have a Wintab complaint driver. After starting PETRA, open the Mapping module and register the tablet, following the procedure outlined in the section above titled *Tablet Registration Instructions*. This enables the capture of line data into one or more of the Overlay layers.

There are two ways to activate the line drawing tool.

1. Click the **Overlay→Edit→Add Line** menu option.



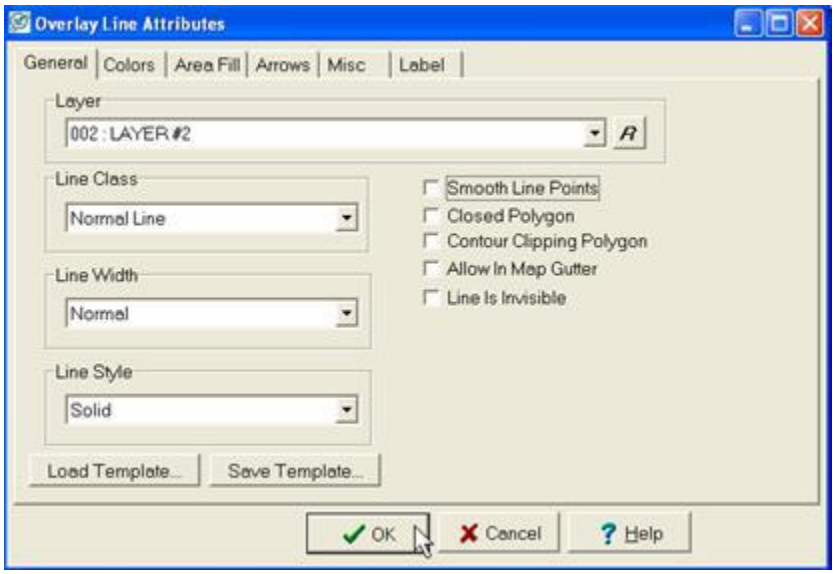
2. Click the **Draw Line Overlay Toolbar** icon . The cursor changes to a large cross hair with a **?** (Question mark) associated with the cross hairs.

3. Verify that the tablet is calibrated by moving the digitizing cursor to the four registration (Calibration) points. The cross hairs should track to the four Red dots on the PC map. If they don't, check to make sure that the tablet was calibrated properly and that the map coordinates correspond with the coordinates in the Main module.
4. Read the Note in the Comment about registering the Digitizing Tablet section of the manual concerning the steps that need to be taken if you have zoomed into an area.
5. You can use the F9 key to turn on the display of the coordinates on the map. Snap to a well, write down the **XY** coordinates, and press the **F9** key again to obtain the Lat/Long coordinates. Write those values down as well.
6. Double click on the well. This takes you back to the Main module.
7. Click the **Location** tab.
8. Compare the coordinates that were written down for the well. If they are not very close, the XY coordinates for the overlay data must be re-computed.
9. In the Map module, click the **Overlay>Edit>Recalc XYs From LatLons** menu. More than likely, the projection for the project was changed, and the X/Y's for the overlay data was not re-computed.
10. Check the coordinates again.
11. Remember to save your overlay file.

Normal Line

1. After clicking on the **Draw Line Overlay** toolbar icon , move the digitizing cursor to the point where you want to begin capturing the data from the map.
2. Press the button for the digitizing mouse that was assigned as the **Left Click** button to capture data points as you move the cursor along the line that you want captured into the overlay.
3. To end the capture process, press the button on the digitizing mouse that was assigned as the **Right Click** button.

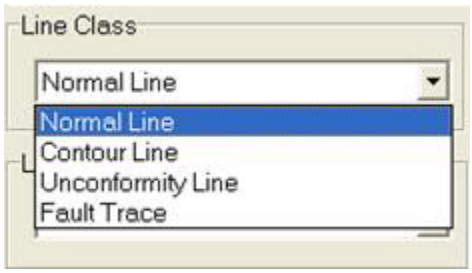
   An ***Overlay Line Attributes*** dialog screen is displayed.



4. After the ***Overlay Line Attribute*** dialog screen is displayed, make choices for the data that was just captured.

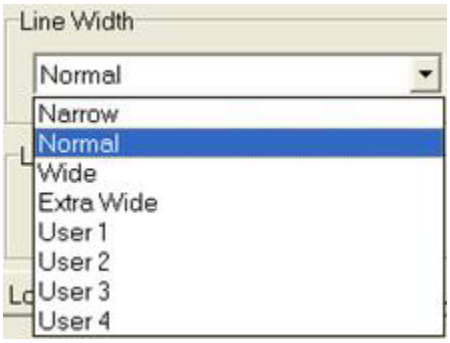
5. Click the Rename Layer button Overlay_Edit_Rename_Layer] to change the name of the layer to a more meaningful name instead of using the default of Layer # 2.

6. You define what class of line you want by clicking the **Line Class** drop down list button to select the desired line class from the available list.



7. Select **Normal Line** for this example.

8. Click the drop down selection button for **Line Width** to see the different Line Widths that are available.



9. Select **Normal** for this example.

10. Click the drop down selection button for **Line Style** to see the different Line Styles that are available.

11. Select Solid for this example.

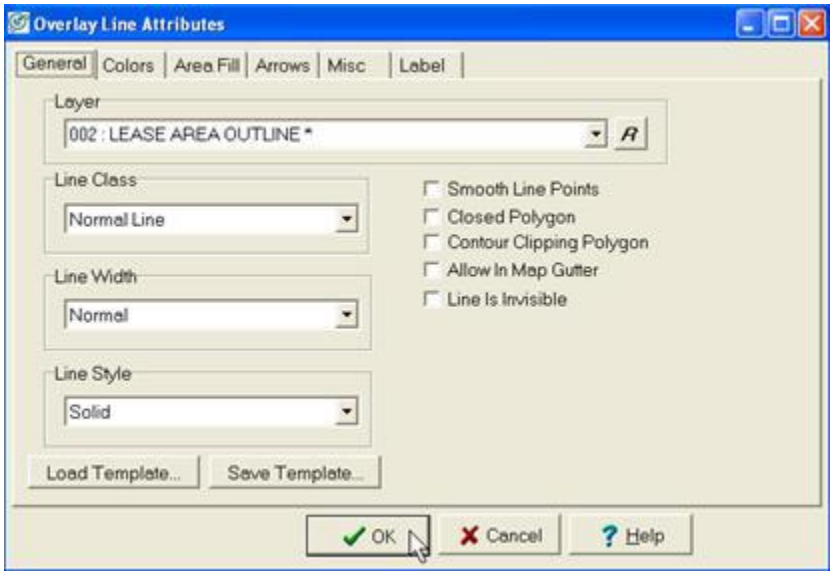
The **Smooth Line Points** fit a curve through the lines that have been captured.

The **Closed Polygon** adds an additional point to the captured data points to make the first and last point be exactly the same.

- Use the **Contour Clipping Polygon** to clip contours that are displayed from a contour grid and/or from a overlay contour layer.
- The **Volumetrics Polygon Name** is used when you want to compute volumetrics from a grid file for a overlay polygon. There is a check box that can be checked if you want to plot the Volumetrics Polygon Name on the map. The option is called **Plot Polygon Name**.
- The option **Allow In Map Gutter** is used when you want the item to plot outside the normal margins of the map. Click the check box to the left of that option to

activate it.

Your ***Overlay Line Attributes*** dialog screen should look something like this:



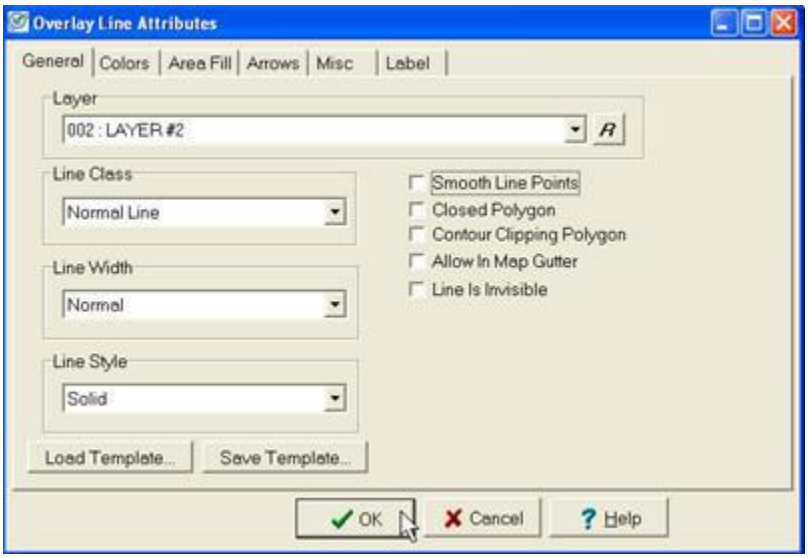
12. Click the **OK** button with the **Green check**.

13. Repeat the process for as many lines as you want to capture.
14. Remember to save your overlay file.

Contour Line

1. After clicking the **Draw Line Overlay** toolbar button move the digitizing cursor to the point where you want to begin capturing the **Contour Line** from the map.
2. Press the button on the digitizing mouse that was assigned as the **Left Click** button to capture data points as you move the cursor along the **Contour Line** that you want captured into the overlay.
3. To end the capture process, press the button on the digitizing mouse that was assigned as the **Right Click** button.

   An ***Overlay Line Attributes*** dialog screen is displayed.



After the **Overlay Line Attribute** dialog screen is displayed, make choices for the data that was just captured.

1. Select a layer for the contours to be captured into and change the name of the layer to reflect the contour data that is being captured.

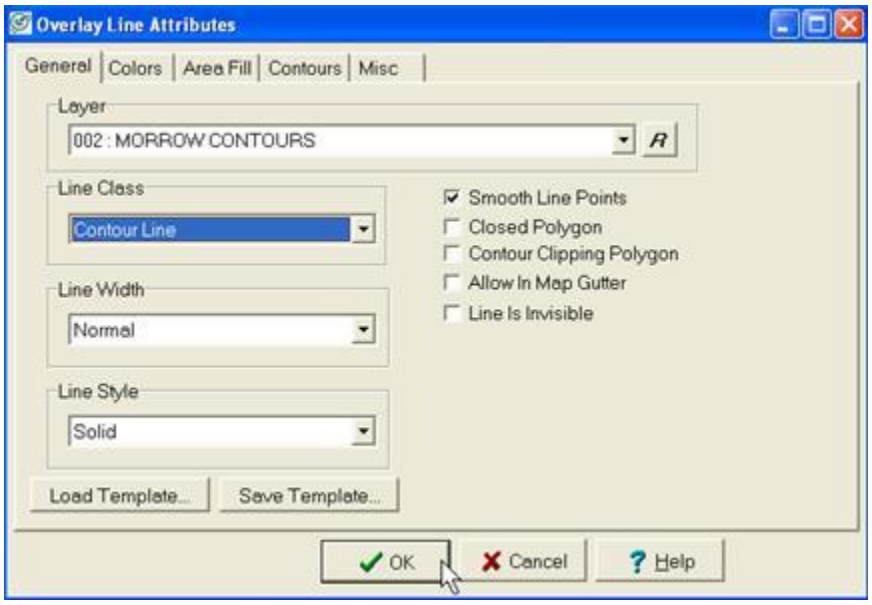
2. Click the **Rename Layer** button to change the name of the layer to a more meaningful name instead of using the default of Layer # 2. For this example, use **MORROW CONTOURS**.

3. Define what **Class** of line you want by clicking the **Line Class** drop-down list button to select the desired line class from the available list. For this example, select **Contour Line**.

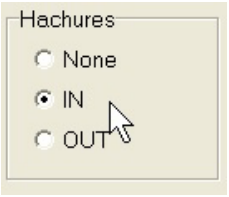
   Another tab is displayed, called Contours.

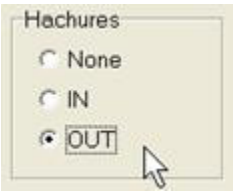
4. Click the Contours tab and enter the Contour Value.

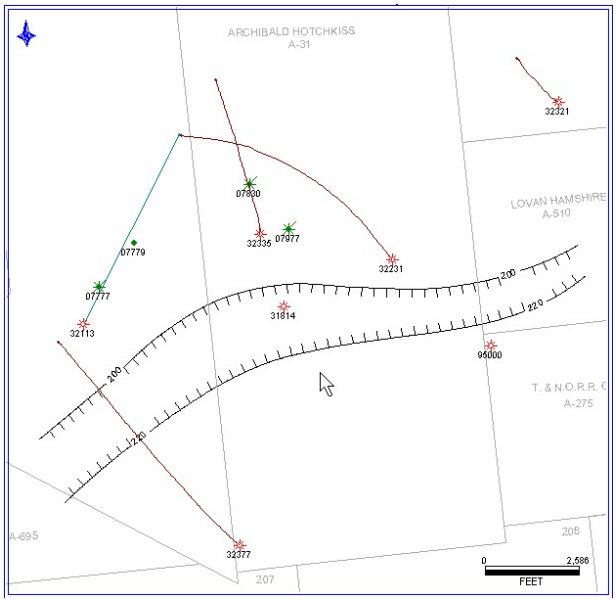
   The Label Height (inches) for labeling the contour lines can be changed, and an option to Label Contour Line can be checked on this screen as well. An example of the ***Overlay Line Attributes*** dialog screens are shown below.

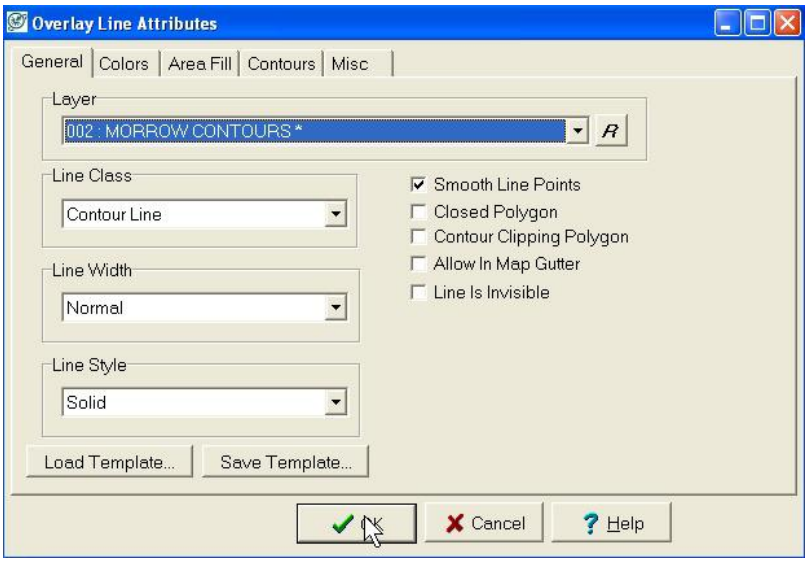


5. Enter the appropriate contour value and select the **Hachures** option. The default is None. The Hachured Contoured Examples shown below are In for the upper contour line set to 200 and Out for the lower contour line set to 220.









6. Click the **OK** button with the **Green check**

on it to write the digitized contour line into memory.

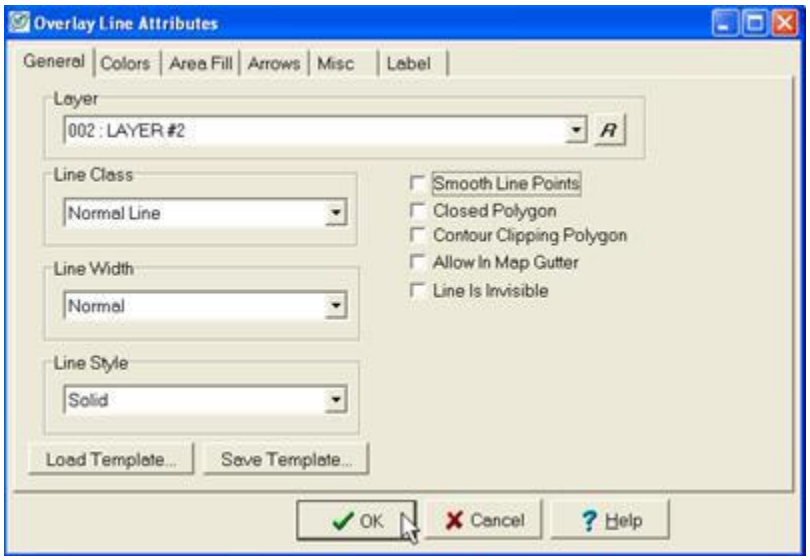
7. Repeat the process for as many contour lines as you want to capture.

8. Remember to save your overlay file.

Fault Trace

1. After clicking the **Draw Line Overlay** toolbar button , move the digitizing cursor to the point where you want to begin capturing the Fault Trace from the map.
2. Press the button on the digitizing mouse that was assigned as the **Left Click** button to capture data points for the Fault Trace as you move the cursor along the Fault Trace that you want captured into the overlay.
3. To end the capture process, press the button on the digitizing mouse that was assigned as the **Right Click** button.

   An ***Overlay Line Attributes*** dialog screen is displayed.



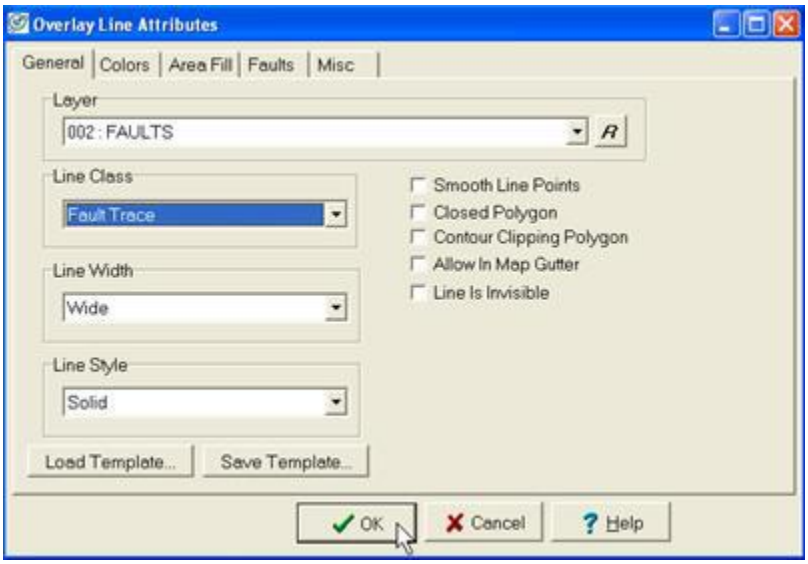
4. Select a layer for the Fault Traces to be captured into and change the name of the layer to reflect the contour data that is being captured.
5. Click on the **Rename Layer** button to change the name of the layer to a more meaningful name instead of using the default of Layer # 2. For this example, use **FAULTS**.
6. Define what class of line you want by clicking on the **Line Class** drop-down list button to select the desired line class from the available list. For this example, select **Fault Trace**.

   Another tab is displayed, called **Faults**.

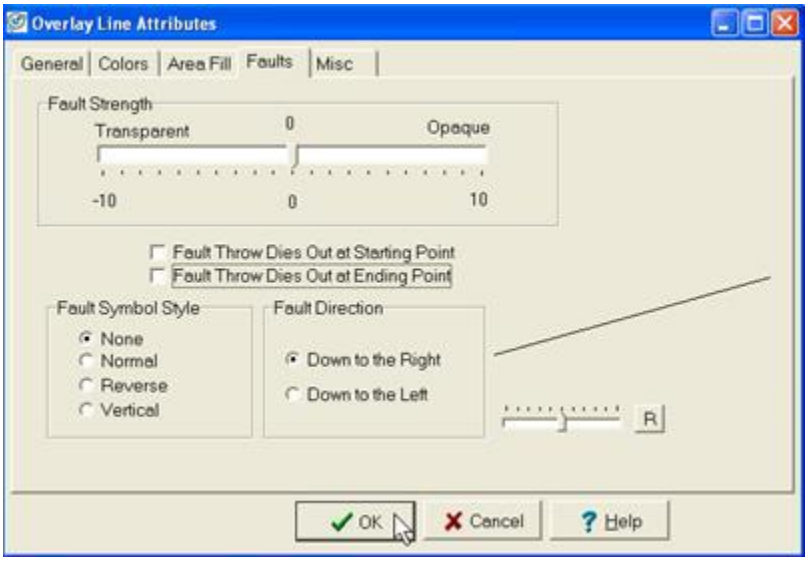
7. When you click on the **Faults** tab, select the attributes to be assigned to the fault line on this screen.

To assist you in determining which Fault Direction you want to select, do as follows:

1. Look down the Fault starting at the first digitized point and face toward the second digitized point to determine Down to the Right or Down to the Left.



2. Select the appropriate options.



3. Click the **OK** button with the **Green check** on it to write the digitized fault line into memory.

   The example faults shown below were digitized with all of the faults starting at the top of the map (Northwest) and going to the bottom of the map (Southeast). Starting on the West of the map, going east, the fault lines shown are as follows:

   Down to the Right, Fault Symbol Style set to None.

   Down to the Right, Fault Symbol Style set to Normal.

   Down to the Right, Fault Symbol Style set to Reverse.

   Down to the Right, Fault Symbol Style set to Vertical.

   Down to the Right, Fault Symbol Style set to Lateral.

   Down to the Right, Fault Symbol Style set to Bar & Ball.

   Down to the Left, Fault Symbol Style set to None.

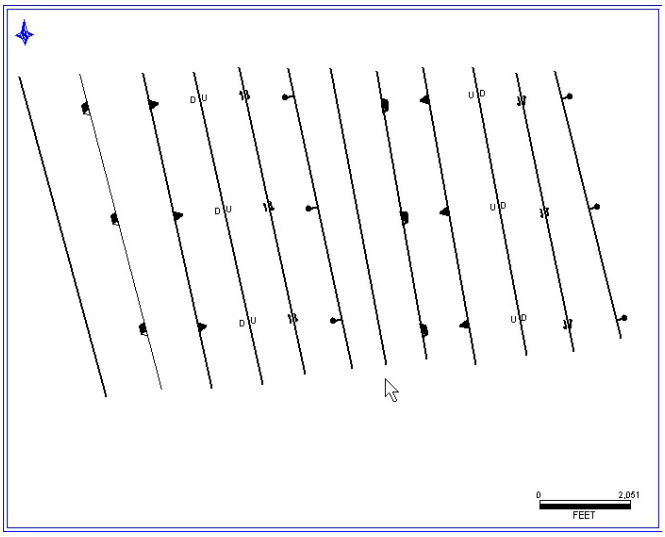
   Down to the Left, Fault Symbol Style set to Normal.

   Down to the Left, Fault Symbol Style set to Reverse.

   Down to the Left, Fault Symbol Style set to Vertical.

   Down to the left, Fault Symbol Style set to Lateral.

Down to the left, Fault Symbol Style set to Bar & Ball.



4. Repeat the process until all of the Fault Trace data has been captured.
5. Remember to save your overlay file.

Using the Digitizing Mouse (Cursor) to Add New Well

There are several ways to add a new well to the database.

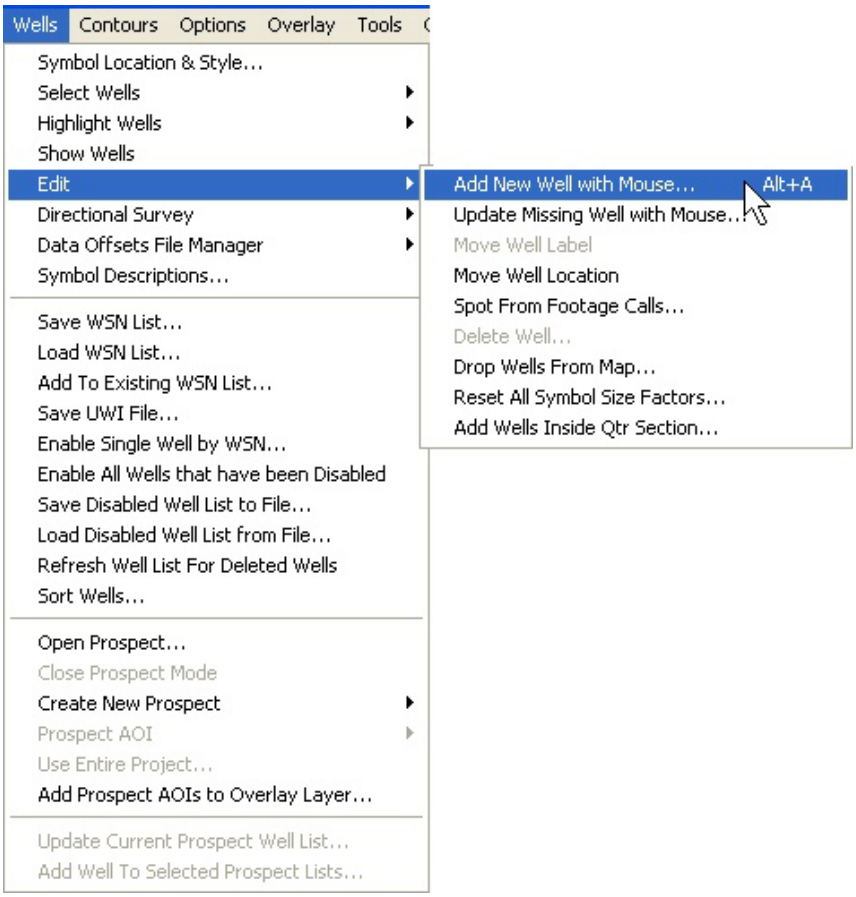
- In the Main module, you can load a well or wells from a file in various formats.
- You can use the **Well→Add a New Well…** menu.

  Note: To see these wells in the Map module, you must select the wells in the Map module so that the Map module knows which wells to display on the Map.

- You can add a well in the Map module with the PC mouse, as well as the digitizing tablet and digitizing mouse.

We'll discuss how to add a new well to the database using the digitizing mouse.

Note: If the tablet has not been registered, you need to register the tablet, following the procedure outlined in the section above titled *Registering the Tablet*.



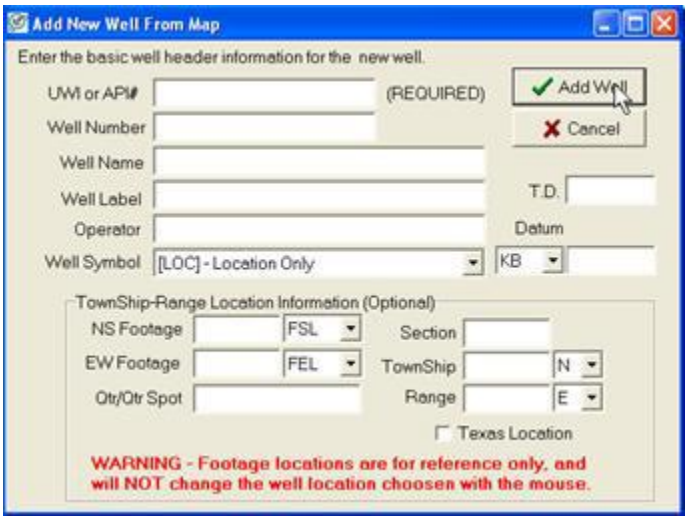
1. Click the **Wells→Edit→Add New Well With Mouse...** menu option.

   The cursor changes to cross hairs.

2. Move the cursor to the location on the map taped to the digitizing tablet where the new well is to be spotted.

For this example, use the survey boundary that is displayed on the map that is labeled T. & N.O.R.R. CO. A-275.

3. Move the cross hairs to the right hand side of the survey boundary about even with well 21 from the top of the survey line and to the left of the right survey boundary line. Click the Left tablet mouse button once. An Add New Well From Map dialog screen will be displayed.



4. Enter the information as follows, or your own information as desired:

   In the UWI or API# data field, enter 4220196000000.

   In the Well Number data field, enter Example # 1.

   In the Well Name data field, enter PETRA Example.

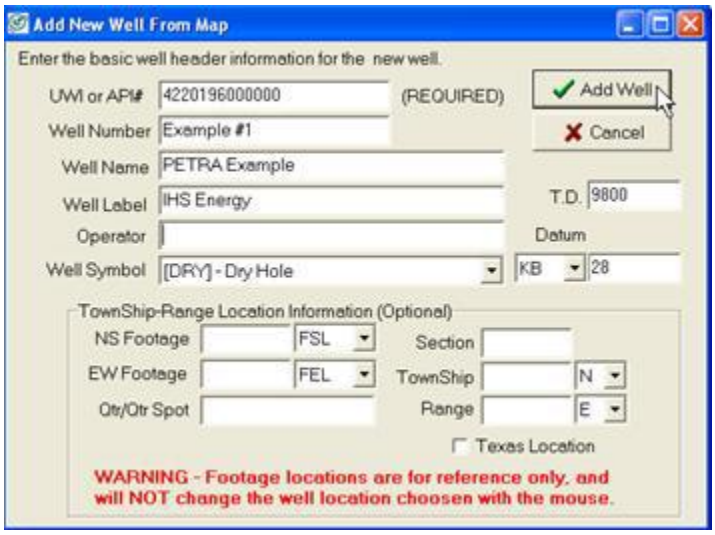
In the Well Label data field, enter Example # 1.

In the Operator data field, enter geoPLUS Corporation.

5. In the Well Symbol data field, click the drop-down button at the end of the data field and select the appropriate well symbol.

   We have chosen the **Dry Hole** symbol for this example.

6. After entering the data click on the Add Well button.



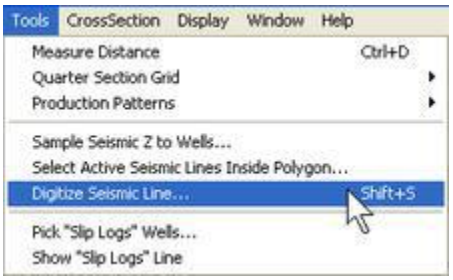
The new well will be displayed on the map in the approximate location as shown below.

7. Repeat the process of clicking on the **Wells → Edit → Add New Well With Mouse** menu option for as many new wells that are to be added.

Using the Digitizing Mouse (Cursor) to Add a Seismic Line and Shotpoints

If the tablet has not been registered, you need to register the tablet following the procedure outlined in the section above titled *Registering the Tablet*.

1. Click the **Tools→Digitize Seismic Line…** menu option.



A dialog screen Digitize Seismic Line is displayed.

2. Enter a **Line Name** in the data field.

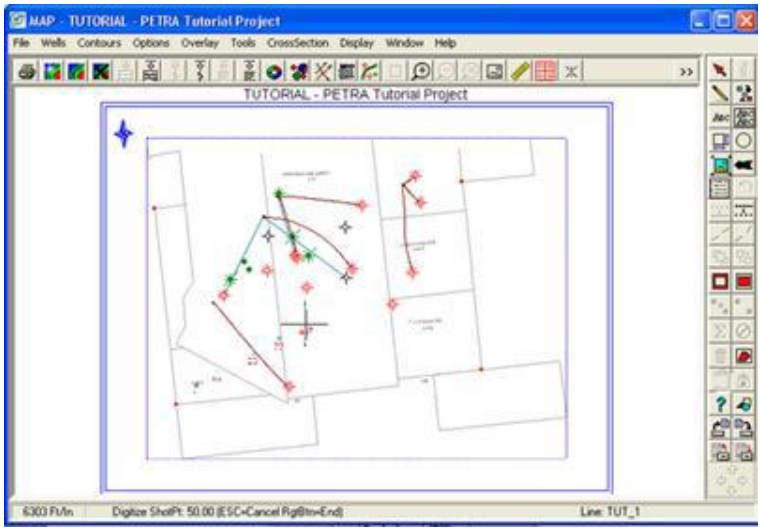
3. In the Digitizing Method section, select either the **Automatic – Set Start End and Increment** or the **Manual – Prompt For Each Shot Point** option by clicking the radio button to the left of the desired option.

   For this exercise, use the **Automatic – Set Start End and Increment** option.

4. In the Automatic Digitizing Settings section enter the **First Shot Point Number**, the **Last Shot Point Number**, the **Shot Point Increment**, and the **Second Shot Point Number**. You can also enter a **Shot Point Extension**, if there is one.
5. Click the check box to the left of the **Redraw Map After Each Line Is Digitized** option, and the map redraws after each line is digitized.
6. After entering the required data for the **Seismic Line** to be digitized, click the **Begin Digitizing** button,

with the **Green Check** on it.
7. Using the **Digitizing Tablet Cursor**, start the **Seismic Line and Shot** point capture by moving the cursor to the first shot point to be captured.
8. Click the button assigned as the **Left Click** to capture the data.

   An example of data being captured is shown below.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File Wells Contours Options Overlay Tools CrossSection Display Window Help
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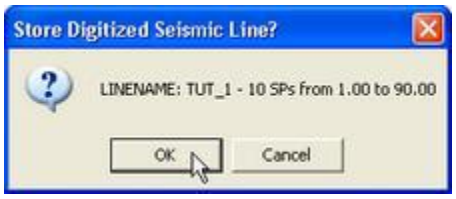
Line: TUT_1

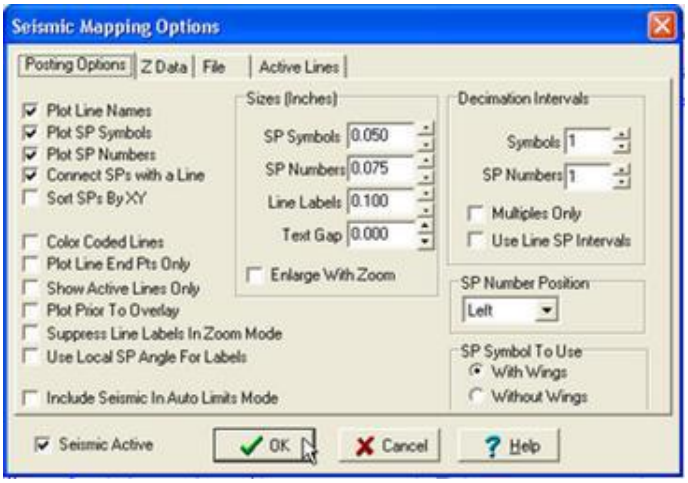
   A Store Digitize Seismic Line? dialog screen is displayed with the parameters for the line.



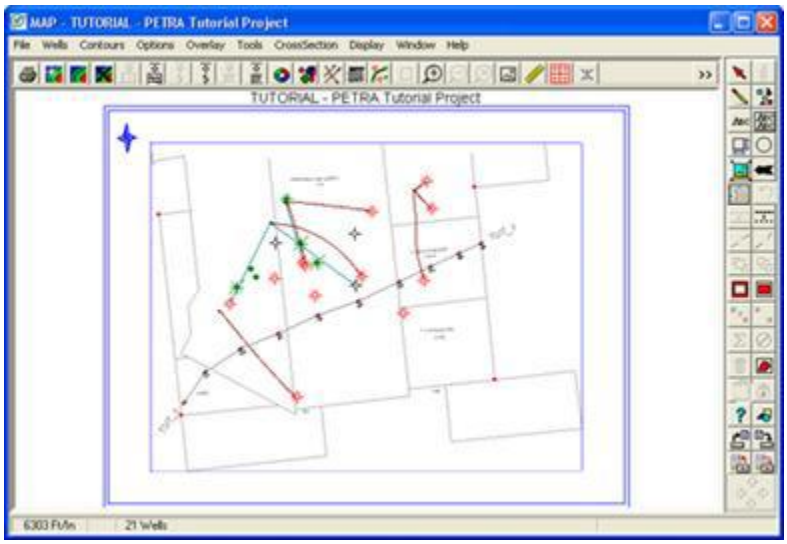
9. Click the **OK** button to store the digitized data into the **Seismic Database**.

Another ***Digitize Seismic Line*** dialog screen is displayed.

10. Enter the new **Line Name** and associated parameters for the new line.
11. Click the **Begin Digitizing** button to digitize the new line.
12. If you have completed the digitizing for all of the seismic lines, click the **Cancel** button.
13. Click the **Seismic Posting** button to bring up the ***Seismic Mapping Options*** dialog screen.
14. Select the desired options, and then click the **OK** button with the **Green Check** to display the digitized seismic line.



An example of the digitized seismic line is displayed on the Map.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General Comments

If you are finished with the capturing of data with the tablet and do not need to capture any other data using the table, you can turn off the **DigitizingTablet(Wintab)** option.

- Click **Overlay→DigitizingTablet(Wintab)→Disabled** menu to turn off the PETRA Tablet.

As long as you do not move the map on the digitizing tablet, you can capture more data that may be on that map at any time in the future by only going through the digitizing process. PETRA remembers that you have previously calibrated a map to capture data into the overlay. The calibration points for the current map will be valid until you move the map on the tablet, change projections, or place a different map on the tablet.

Note: Remember to repeat the calibration process when you move a map on the tablet, change projections, change the overlay, modify the area of interest in any way, or want to use another map for capturing data.

PETRA can capture line data directly into the overlay from a digitizing tablet. The tablet must have a WinTab compliant driver. After you have started PETRA, you need to start the Mapping Module and register the tablet so you can properly capture your line data into one or more of the Overlay layers

Using the digitizer tablet, you can add new wells to the database and add Seismic Lines to the Seismic 2D database as well.

Please refer to the chapter *Capturing Data with a Digitizer* for configuration setting using the Win Tab driver.

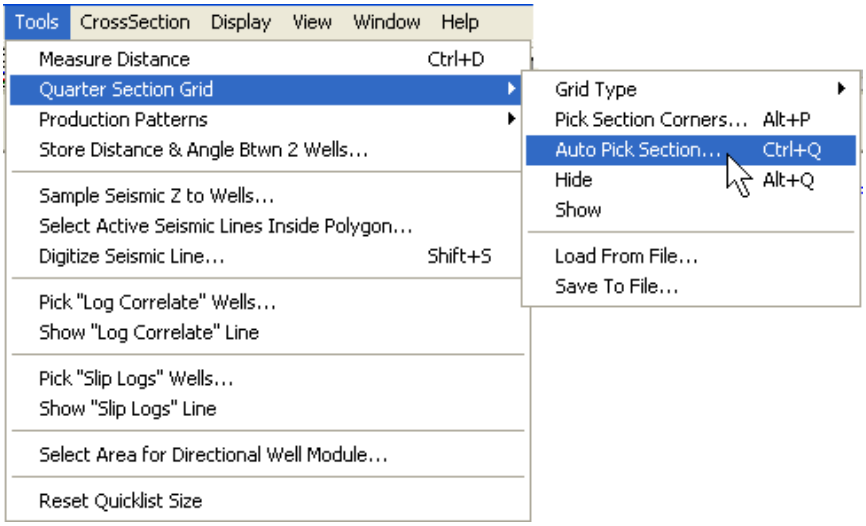
Using Footage Calls to Spot a Well

Modifying the location for a well in PETRA is easily accomplished by using the tools provided in either the Map Module or the Main Module. One of the tools provided in the Mapping Module allows a well location to be computed from footage calls. Any well that you spot using footages must already appear somewhere on the map. If you are spotting a new well, it can easily be added using the **Wells→Edit→Add New Well with Mouse** menu.

Note: Refer to the chapter *Capturing Data with a Digitizer*" to see how to capture wells using the digitizing tablet.

The footage call spotting process involves digitizing the four corners of a grid, called the Quarter Section Grid. This grid, which outlines a section or survey block, serves as the reference lines for spotting the well. Although PETRA simply needs four points picked with the mouse to define the grid corners, this tutorial example demonstrates a snapping technique to insure accuracy of the grid corners. Without snapping, the corners can only be as accurate as the screen resolution, which may not be good enough for spotting wells.

If you have a project that has sections loaded in the overlay, you can also use the **Auto Qtr Section Grid** icon or the **Tools→Quarter Section Grid→Auto Pick Section...** menu or the **Ctrl+q** function keys to automatically draw the quarter quarter section grid lines for the section that you click in.



For this tutorial example, use the survey boundary displayed on the map and labeled T. & N.O.R.R. CO. A-275. If for some reason the overlay data is not displayed, click the **Overlay→Load→Overlay File…** menu. Select the **Landgrid.OVL** file, and then click **OK**. The cartographic data for the Tutorial Project is displayed.

The following describes the snapping method to draw the Quarter Section Grid.

1. Position the mouse cursor near one of the survey corners, and then press the **F2** key to snap the mouse to the nearest control point of an overlay line.
2. **Without Touching the Mouse**, press the **Enter** key to register or pick the point.

   Caution: Do not try to pick the point with the mouse after snapping. This causes the mouse to move slightly as the button is clicked, thus changing the snap point.
3. To begin adding the Quarter Section Grid to the map, click the **Tools→Quarter Section Grid→Pick Section Corners** menu.

   The cursor changes to cross hairs, and a message is displayed at the bottom of the Map Display screen to the right of the map scale.

4. Capture the four grid corners in a clockwise direction, starting with the lower left corner of the grid.

a. Using the mouse, move the cross hairs close to the lower left corner of the section that you want to create the quarter section grid for.

Caution: Do not use the mouse buttons to capture the corner points.

b. Press the **F2** function key located at the top of the keyboard. This snaps the cross hairs to that section corner.

c. Press the **Enter** key. That corner is now captured in memory.

d. Move the cross hairs to the upper left corner of the section that you are capturing the corner locations for.

e. Press the **F2** function key. When the cross hairs snap to the corner, press the **Enter** key to capture that corner into memory.

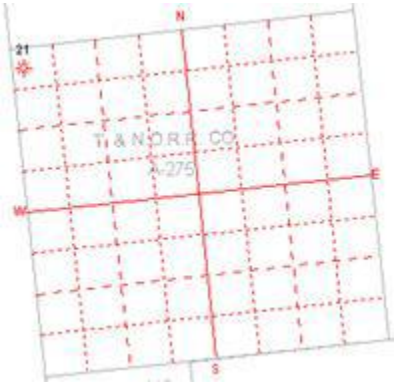
f. Move the cross hairs to the upper right corner of the section that you are capturing the corner locations for.

g. Press the **F2** function key. When the cross hairs snap to the corner, press the **Enter** key to capture that corner into memory.

h. Move the cross hairs to the lower right corner of the section that you are capturing the corner locations for.

i. Press the **F2** function key. When the cross hairs snap to the corner, press the **Enter** key to capture that corner into memory.

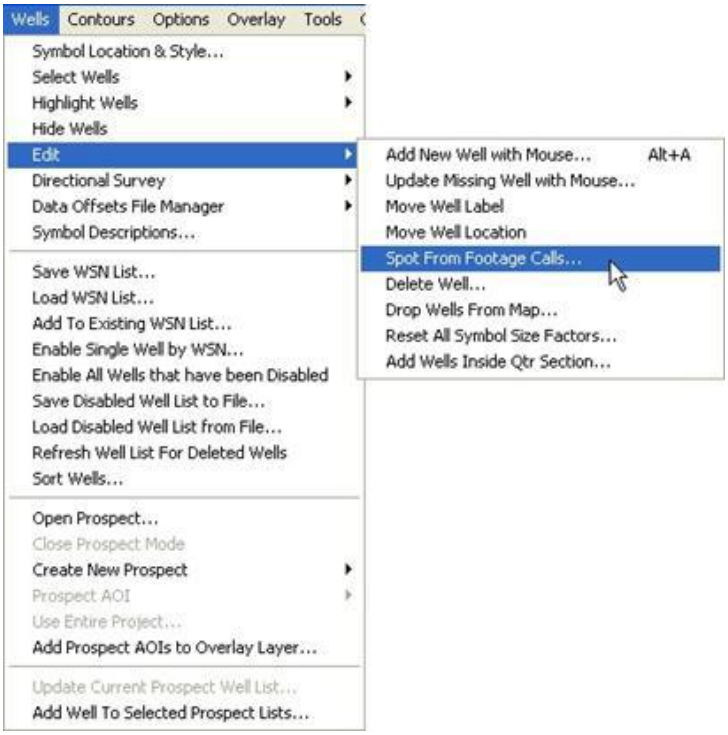
After you capture the four corners, the quarter section grid is displayed.



5. Click the well you want to move. For this tutorial example, click the well with well sequence number **21**

The well is highlighted with a green circle around it.

6. Click the **Wells→Edit→Spot From Footage Calls** menu.



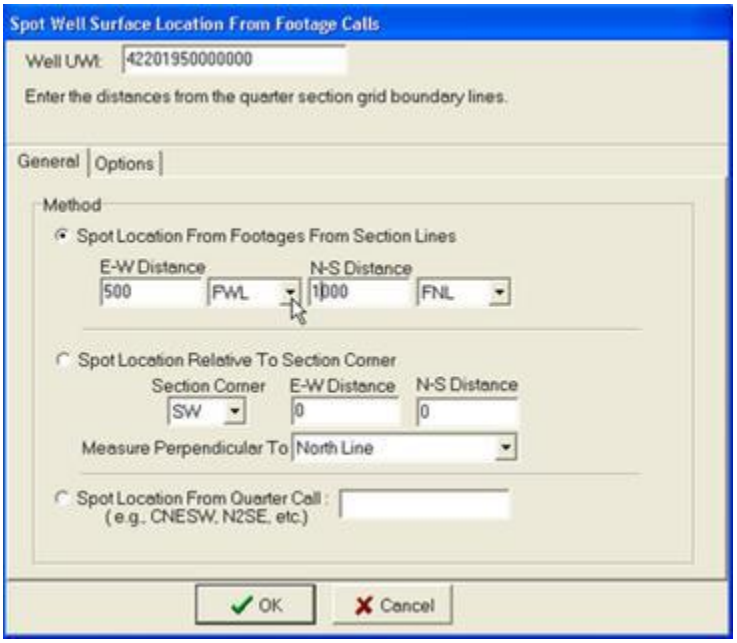
A ***Spot Well Surface Location From Footage Calls*** dialog screen is displayed. In the tutorial example, use 500 feet from the west line and 1000 feet from the north line.

Note: The following warning message is displayed if you do not click the well before you click the Wells→Edit→Spot From Footage Calls menu.

7. Change the FWL to **FEW** by using the drop-down list button.

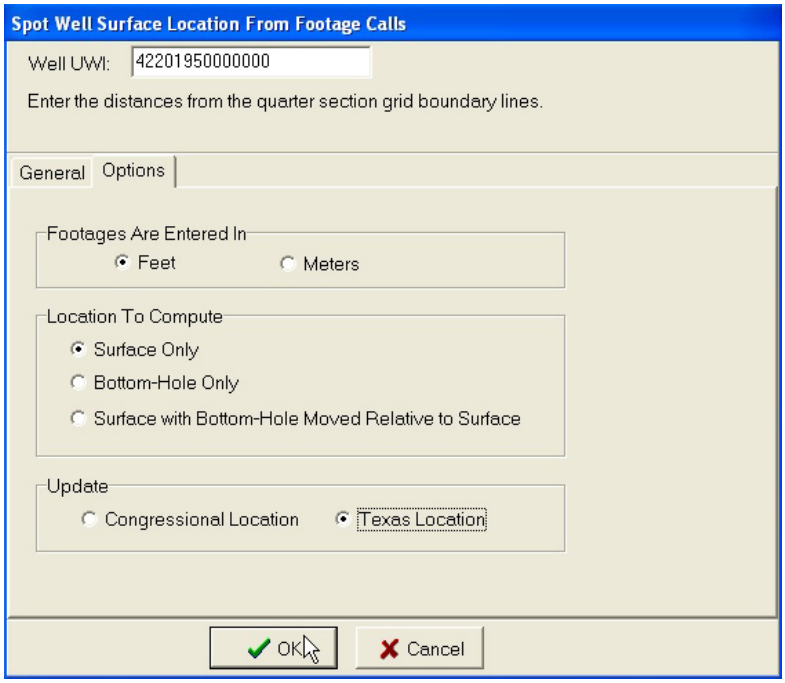
   You can change the FNL **FSL** in the same manner.

8. Enter **500** in the data field for the E-W Distance and 1000 in the N-S Distance data field.



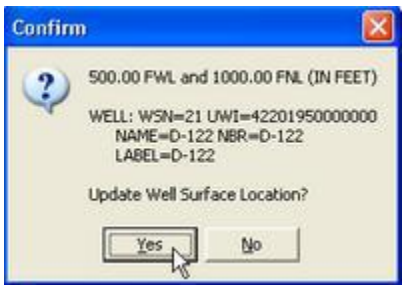
9. Click the **Options** tab.
10. Click the radio button to the left of **Feet** in the **Footages Are Entered In** section.
11. Click the radio button to the left of **Surface** in the **Location To Compute** section.

12. Click the radio button to the left of **Texas Location** in the **Update** section.



13. Click the **OK** button with the green check.

    The message displayed below is shown. Click **Yes**.



14. Click **Yes.**

    The well is re-positioned to the location as shown in the example below.

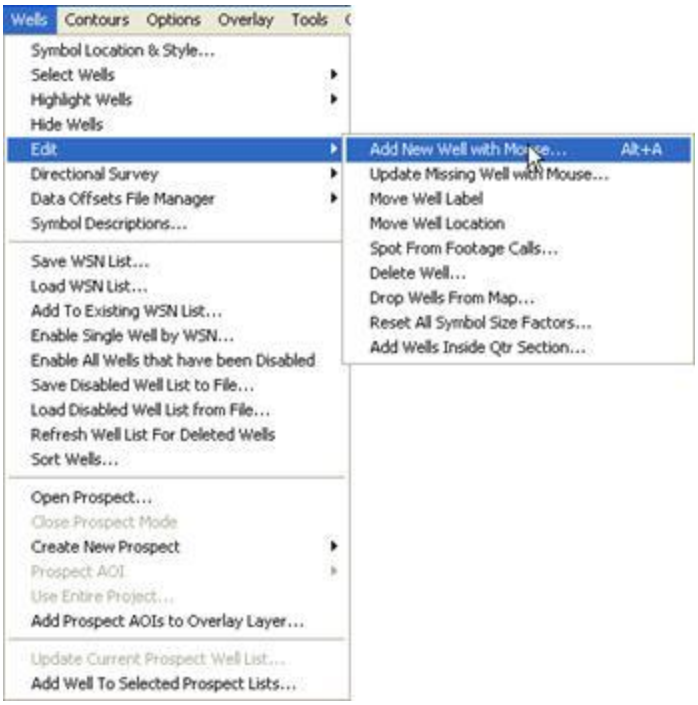
15. To turn the Quarter Quarter Section grid off, click the **Tools→Quarter Section Grid→Hide** menu option or use the function keys **Alt+q**.

Using the Mouse to Add a New Well

There are several ways to add a new well to the database. This section discusses how to add a new well to the database using the mouse. If you know the approximate location on a map where a well is supposed to be located and need to spot that well until you have the actual location, you can accomplish this very easily in the mapping module. The mapping module is initiated using the **Tools→Mapping** menu option on the main screen or the **Mapping** icon.

To add a new well using the mouse,

1. Click the **Wells→Edit→Add New Well With Mouse** menu option or the function keys, **Alt+A**. The cursor changes to cross hairs. Move the cursor to the location on the map where the new well is to be spotted.

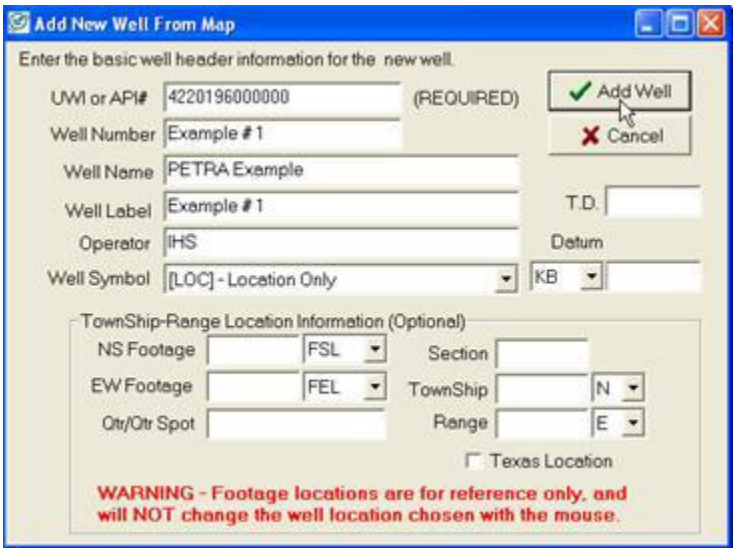


For this example use the survey boundary that is displayed on the map that is labeled **T. & N.O.R.R. CO. A-275**.

2. If for some reason the overlay data is not displayed, click the **Overlay→Load→Overlay File…** menu.
3. Select the **Landgrid.OVL** file, and then click **OK**.

   The cartographic data for the Tutorial Project is displayed.
4. Move the cross hairs to the right side of the survey boundary about even with well 21 from the top of the survey line and to the left of the right survey boundary line.
5. Click the left mouse button once.

   An Add New Well From Map dialog screen is displayed.



6. Enter the following information:

   In the *UWI* or *API#* data field, enter **4220196000000**.

   In the *Well Number* data field, enter **Example # 1**.

   In the *Well Name* data field, enter **Petra Example**.

   In the *Well Label* data field, enter **Example # 1**.

   In the *Operator* data field, enter **IHS**.

   Note: When you are adding a new well for your project, the above information is based on the new well that you want to enter for your project.

   If you have the information, you can also enter the footage call information at this time. Refer to the "WARNING – Footage locations are for reference only, and will NOT change the well location chosen with the mouse." message at the bottom of the dialog screen

   You can modify the estimated location to the correct location based on the footage calls by going through the procedure described above in *Using Footage Calls to Spot a Well*.

7. After entering the data, click the **Add Well** button.

The new well is displayed on the map in the approximate location shown below.

Using the Mouse to Move a Well Location

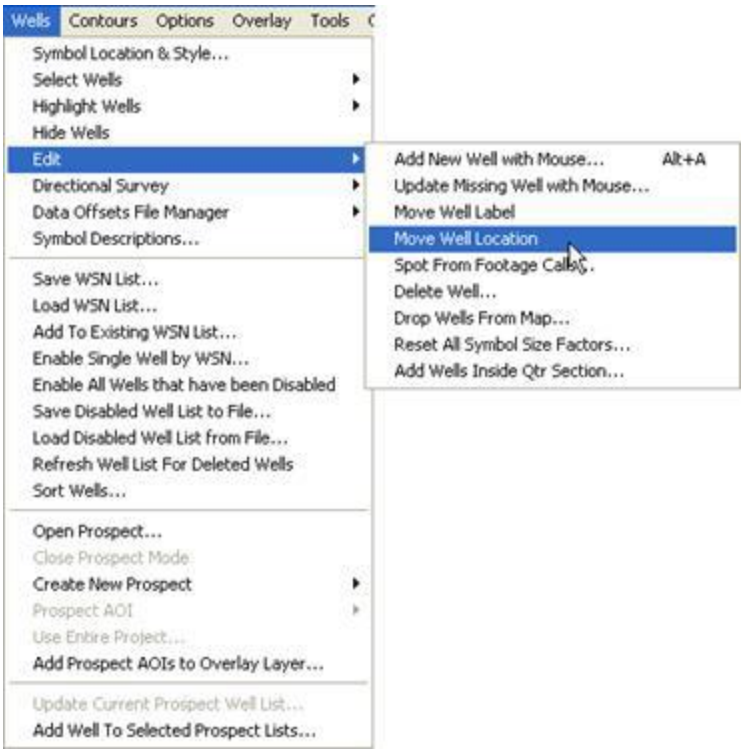
When you can visually locate a well on the map, but you know the location on the map is not correct, you can move the well with the mouse.

1. Click the well to be moved, and then click the **Wells→Edit→Move Well Location** menu. (Use the last well added to this tutorial project to try this procedure. The well is **Well Sequence Number 22** located in the survey boundary displayed on the map and labeled **T. & N.O.R.R. CO. A-275**.)

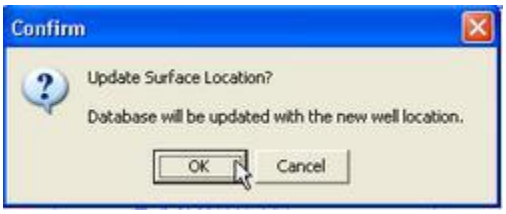
   If for some reason the overlay data is not displayed, click the **Overlay→Load→Overlay File…** menu.

2. Select the **Landgrid.OVL** file, and then click **OK**.

   The cartographic data for the Tutorial Project is displayed.



You see the message displayed below if you fail to click a well before clicking the **Well→Edit→Move Well Location** menu.



3. Click the well that you want to move to another location.
4. Click the **Well→Edit→Move Well Location** menu.

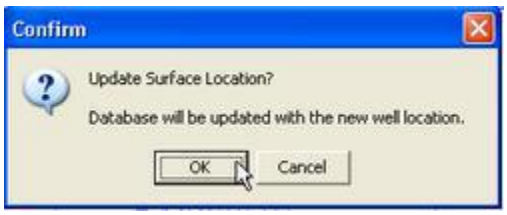
   The cursor changes to cross hairs and a blue rubber band line is drawn from the selected well.
5. Move the mouse to the left.

   You see the blue rubber band line being drawn as you move the mouse.
6. Once you move the cross hairs to the new location for the well, click the left mouse button once.

7. Click the radio button to the left of **Surface Location Only,** and then click the **OK** button with the green check.

A confirmation screen is displayed.

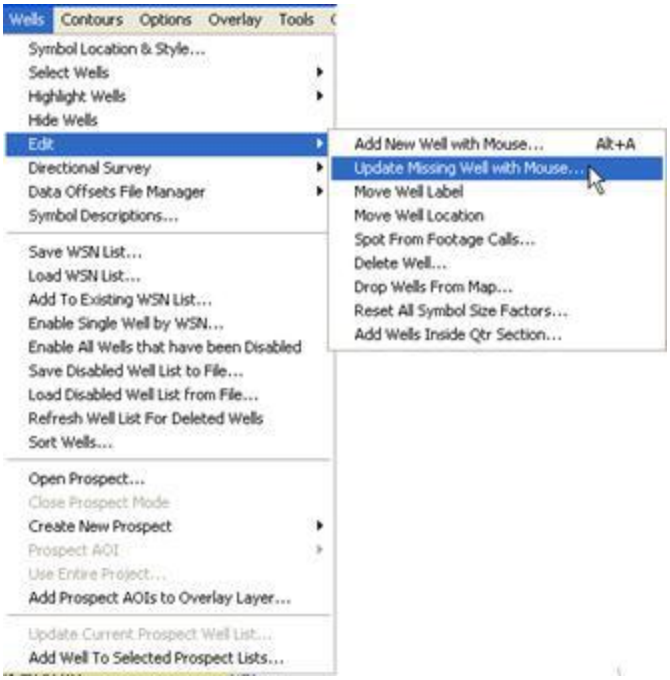
8. Click **OK**.



The display below shows the well in the new location.

Using the Mouse to Update Missing Well

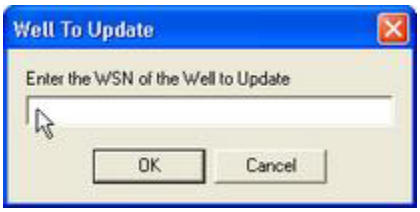
When you have added wells that do not have a location and they need to be spotted on the map, you can use the **Wells→Edit→Update Missing Well with Mouse** menu.



1. Click the **Wells→Edit→Update Missing Well with Mouse** menu.

   A ***Well To Update*** dialog screen is displayed.

2. Enter the **WSN** of the well that needs to be updated. You can obtain the WSN for the well from the Main module.



3. After entering the correct WSN, click **OK**.

   The well is spotted at the location chosen by the cursor on the map where it was positioned.

   If you enter a WSN that already has a longitude/latitude value, you see the following ***Warning*** dialog screen.

WARNING
The selected well already has a Lat-Lon value. You will need to set the value to zero in Main before you can update it with this function.
OK

7

Cross Section Module

Cross sections provide a profile view of a series of wells and illustrate structural or stratigraphic relationships in two dimensions.

PETRA can display cross sections containing digital log curves and/or scanned raster log images, formation tops, faults, posted well information, cored, perforated, tested intervals, and interpretive overlays. Structure and stratigraphic cross section options are available with wells displayed in either vertical or deviated borehole format including horizontal wells.

Log curve selection and track layouts are totally customizable. Digital Log Curves can be shaded using a cutoff value or shaded using another facies log to produce a geocolumn display. Shading can also be performed between two log curves.

The cross section offers powerful editing tools beyond normal display functions. Formation tops can be correlated interactively, well logs can be edited and depth shifted, and user-drawn annotations can be added as an interpretive overlay.

Starting a Cross Section

The cross section module is typically initiated from the Mapping module; however, it can also be initiated from the Main module by using the **Tools→Cross-Section** menu option on the Main screen, the **Cross-Section** icon, or for a single well, the **Logs→Single Well Cross Section...** menu can be used. When initiating the cross section from the Mapping module, the cross-section is automatically invoked when you select the cross section wells.

The mapping module provides five options for cross section well selection.

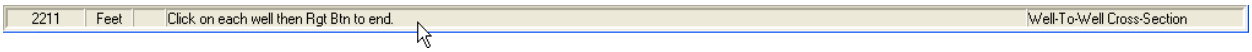
- The **CrossSection→Well-To-Well...** menu option allows you to select each well for the cross section by clicking a sequence of wells from the map.
- The **Single Well Display...** option allows you to select the single well that is displayed in the Single Well Cross Section.
- The **CrossSection→Line & Corridor...** option allows you to select the two end points of a line of section and a corridor on either side for well inclusion.
- The **CrossSection→Line & Wells...** option allows you to select the two end points of a line of section and the individual wells on either side of the line for well inclusion.

- The **CrossSection→Select Wells From List...** option allows you to select wells from the current map selected wells for well inclusion. For this tutorial example, use the **Well-To-Well** option.

Note: If the Bubble Map is displayed, click the check box to the left of **Bubble Map** to turn off the display.

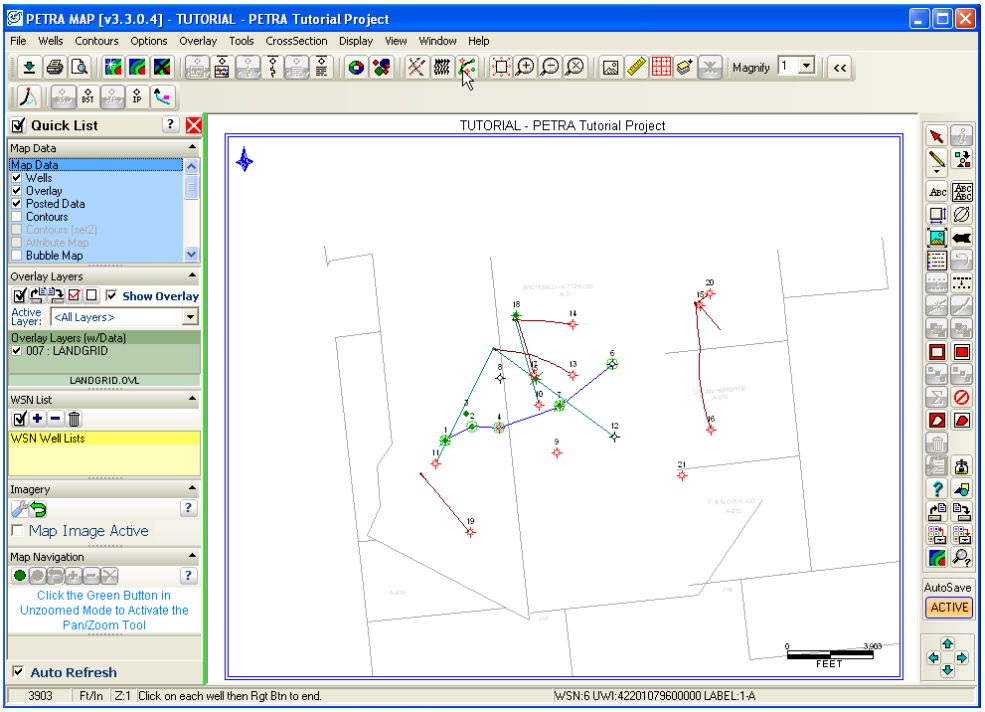
1. Open the mapping module and select the **CrossSection→Well-To-Well...** menu or the **Well-To-Well Cross Section** icon.

   The cursor changes to a cross hair with a message in the lower panel of the Map screen that reads, "Click each well then Rgt Btn to end."



2. Using the left mouse button, click and release the mouse button on 3 or 4 wells in sequence that form somewhat of a straight line across the map. Note the rubber band line indicating the line of section.

   The sequence of wells illustrated is WSN 1, 2, 4, 7, and 6.

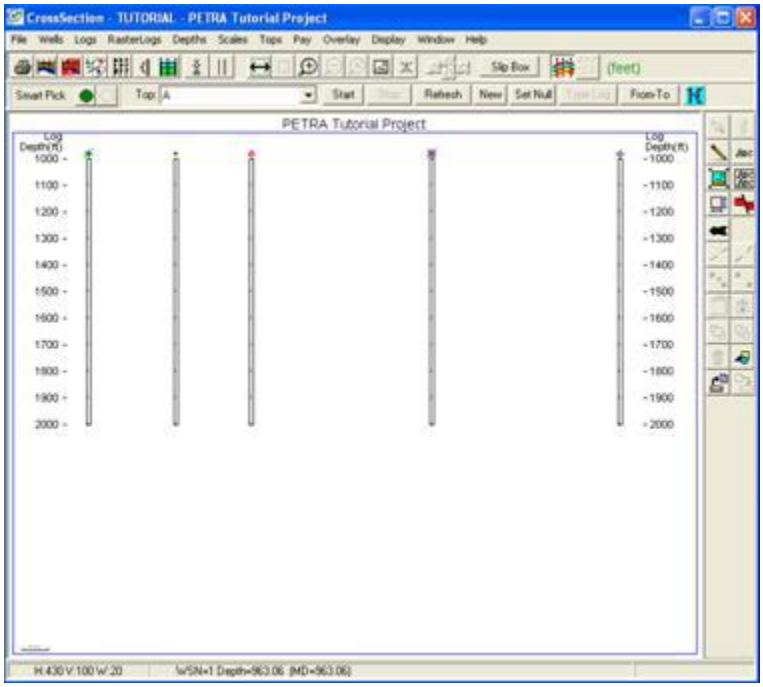


3. Press the **Delete** key to drop the last well picked if you change your mind.

4. After clicking the last well, click the right mouse button once to end the picking mode.

   The Esc key cancels the cross section picking mode altogether.

   The cross section module is activated showing a stick diagram of the selected wells in the order they were picked from left to right.



   The stick diagram is only drawn the first time you enter the cross section module. Thereafter, the cross section is displayed based on the template that has been developed to display the cross section. The wells are spaced relative to the well symbol locations on the map.

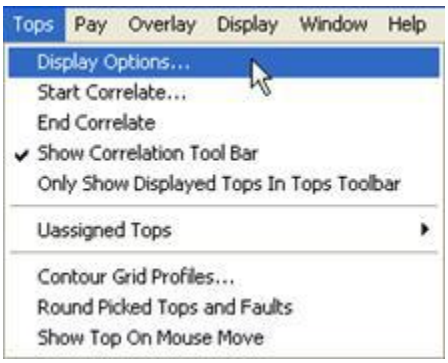
Note: The very first time you enter the cross section module, the depth scale needs to be set to the interval of interest. PETRA provides an automatic mode to set the depths using either tops or logs.

Automatic structure depth using formation tops

A structural cross section containing formation tops and log curves is displayed. The default cross section shows a depth range from 1000 to 2000 feet with a vertical scale of 100 feet/inch. Specify a depth interval that includes the formation and log data we wish to illustrate. PETRA

offers two short cuts, which automatically sets the depth range to the selected formation tops or log curves. To use the tops option, first select the tops you want to display on the cross section.

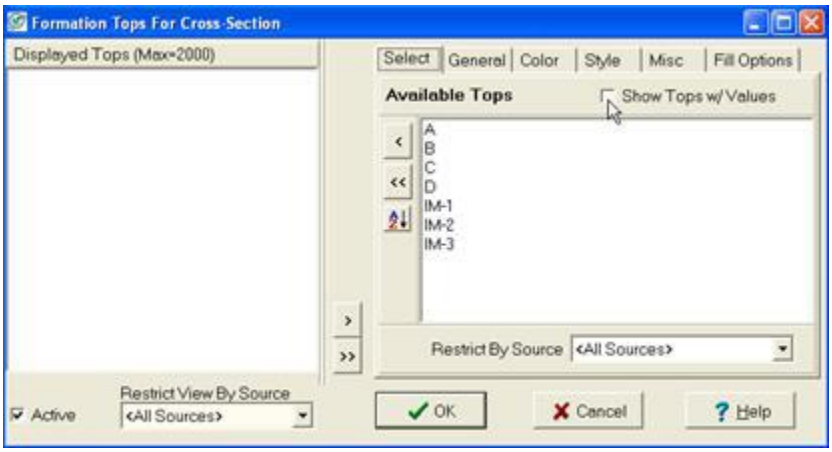
1. Select the **Tops→Display Options...** menu or the **Select Tops** icon.



A ***Formation Tops For Cross-Section*** dialog screen is displayed. All formation tops are listed in the Available Tops list.

2. To list the tops that are active for the wells that are selected for the cross section, click the check box to the left of **Show Tops w/Values**.

   The list of tops is reduced to those tops that have data for the cross section selected wells.



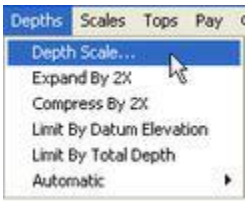
3. Click to highlight top **A**, and then click the **Add** button.

   Top A appears in the Displayed Tops list.

4. Repeat the selection for top **B** by simply double clicking **B** in the Available Tops list. Many options are provided to control color and style of the drawn tops, which are discussed later.

5. Click **OK**. The cross section redraws but does not show the tops because the depths that are currently selected are not deep enough for the selected tops.

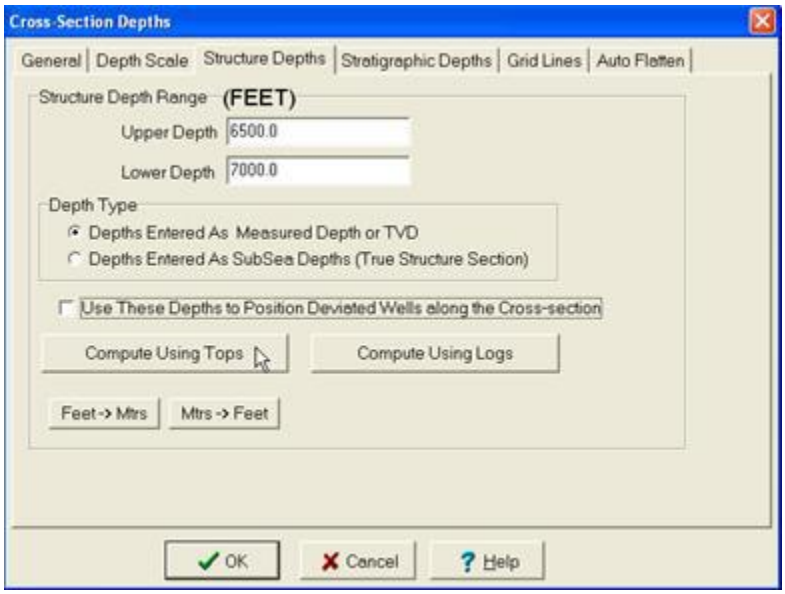
6. Click the **Depths→Depth Scale...** menu or the **Set Depth** and **Scale** icon to display the ***Cross-Section Depths*** dialog screen.



7. Click the **Structure Depths** tab.

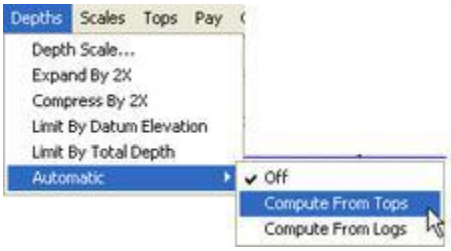
8. Click the **Compute Using Tops** button.

   The Upper and Lower Depths are set based on the selected tops.

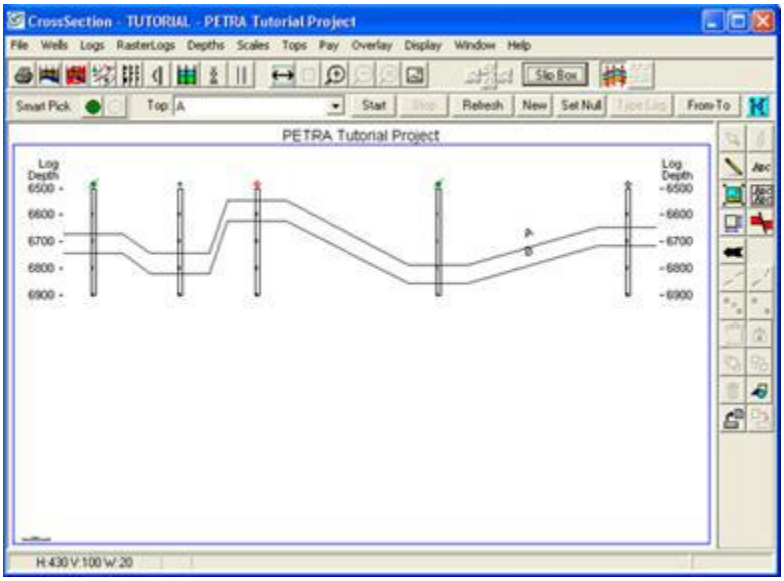


9. Click the **OK** button with the green check to redraw the cross section showing a structural cross section with the two tops.

10. Optionally, you can click the **Depths→Automatic→Compute From Tops** menu. The screen redraws showing a structural cross section with the two tops that were selected earlier.



Note: If you had log curves displayed, you could use the **Depths→Automatic→Compute From Logs** menu to show the structural cross section with the depths based on the depths of the selected curves.

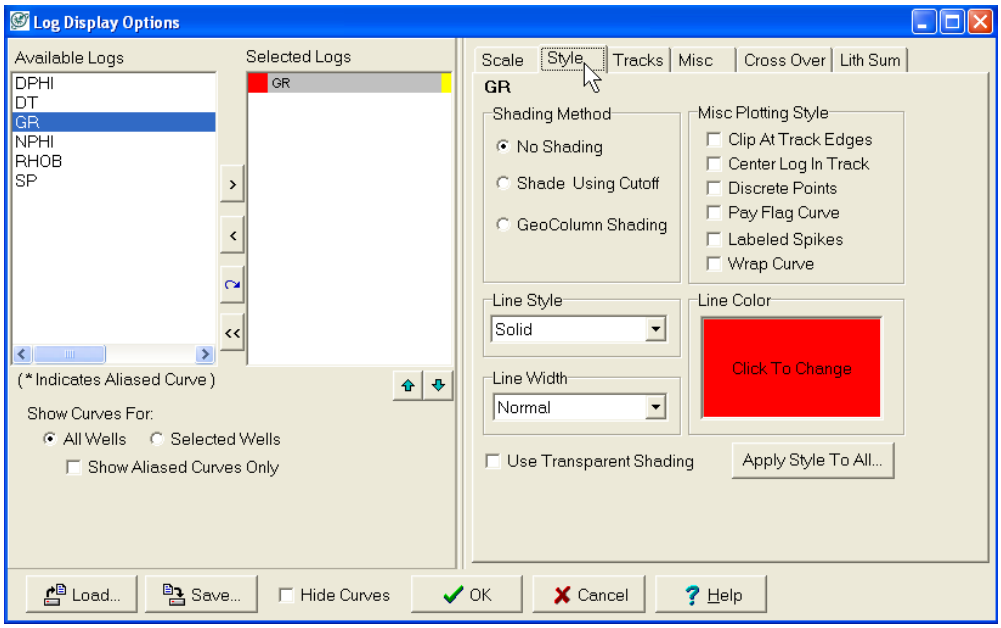


You can quickly adjust the vertical scale by using the **Depths→Expand By 2X and Depths→Compress By 2X** menus.

Selecting digital log curves

The tutorial displays the gamma ray log in the track just to the left of the depth track (Track 1).

1. Click the **Logs→Scales and Display Options...** menu or the **Select Logs and Scales** icon to display the log selection dialog screen.



2. Double click the **GR** curve listed under the Available Logs column,

   OR

   click the **GR** curve, and then click the **Add Curve** button to move the GR curve to the Selected Logs column.

   The Scale tab section indicates the track number and left and right track scales. Default values are computed from the selected curve for the well in the cross-section. The small color box to the left of the curve indicates the color in which the log is drawn. You can choose to show the curves, which are available for only the selected wells or those available for all wells by clicking the radio button to the left of **All Wells** or **Selected Wells** at the bottom of the dialog screen in the Show Curves For: section.

3. To change the GR curve line color to red, click the **Style** tab to change the line color from black to red.

4. Click the color box below the Line Color option to display the ***Color*** dialog screen.

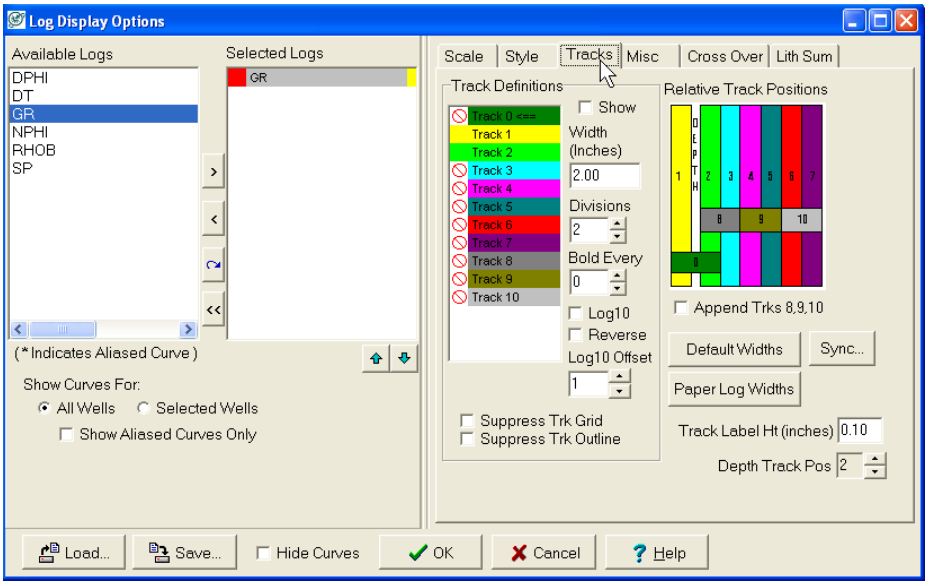
5. Click the **red** color cell in the Basic colors section of the dialog screen.

6. Click **OK**.

   You see a red box appear to the left of the GR curve to indicate the color of the curve line, and you see yellow to the far right of the GR curve to indicate that the curve is to be

plotted in Track 1. The tracks are color coded. In the Shading Method section, you can set the option to **Shade Using Cutoff** or to perform **GeoColumn Shading**. There are miscellaneous options in the Misc Plotting Style section that may be set as well as changing the Line Style and Line Width by using the drop down menus.

7. Click the **Tracks** tab to see the colors assigned to the various tracks. You can set the option to **Shade Using Cutoff** or to perform **GeoColumn Shading**. There are miscellaneous options that may be set as well as changing the Line Style and Line Width.



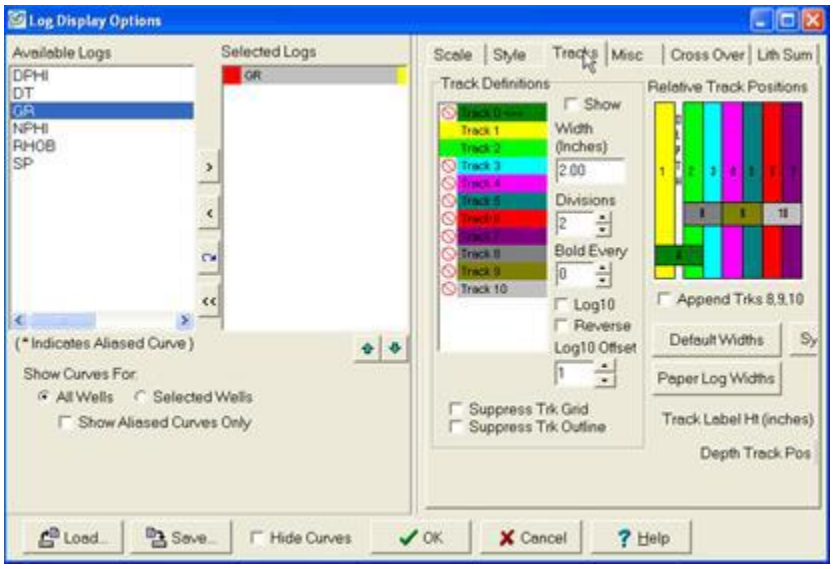
8. Refer to the Help screen for additional information by clicking the **Help** button at the bottom of the dialog screen.

To select or view which log track the GR curve is plotted in or to change the track reference number of a log,

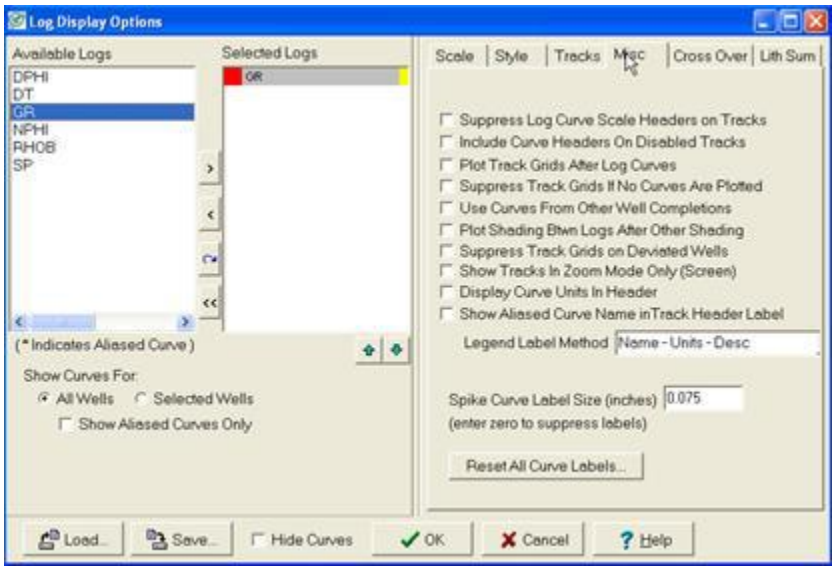
1. Click the **Tracks** Tab.

   The small colored box on the right side of the curve indicates which track the curve has been assigned. For the GR curve, there is a small yellow box on the right side of the Selected Logs display. Note that yellow is assigned to track 1. Also note that tracks 1 and 2 are the only tracks that are turned on at this time. There will only be the two tracks grids drawn. The Track Definitions refer to the track grid only and does not affect drawing the log curve(s).

2. To change the track reference number of a log, click the Scale Tab. Click the Selected Log, in this case "GR," and use the Up and Down scroll buttons to change the track number for the specified log curve.

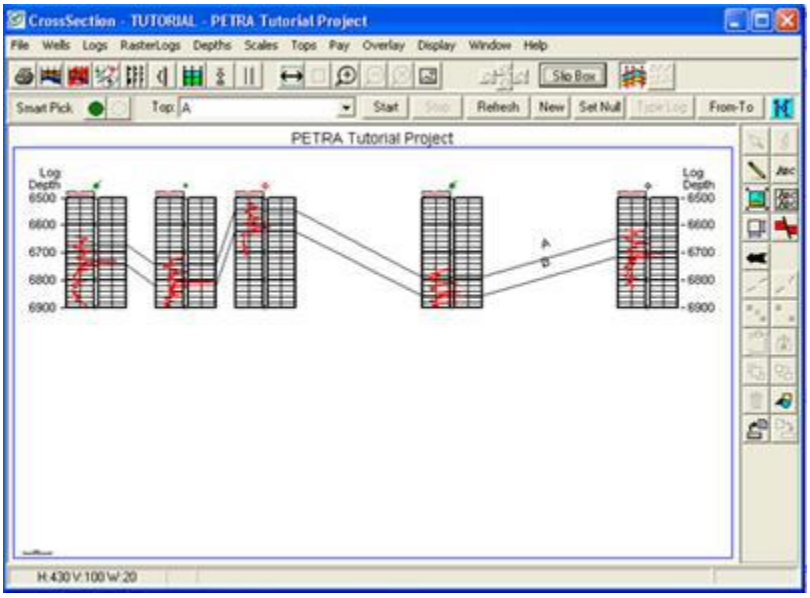


Note: The Miscellaneous (**Misc**) tab contains additional options used to control curve plotting. Click the **Misc** tab to change the various options.



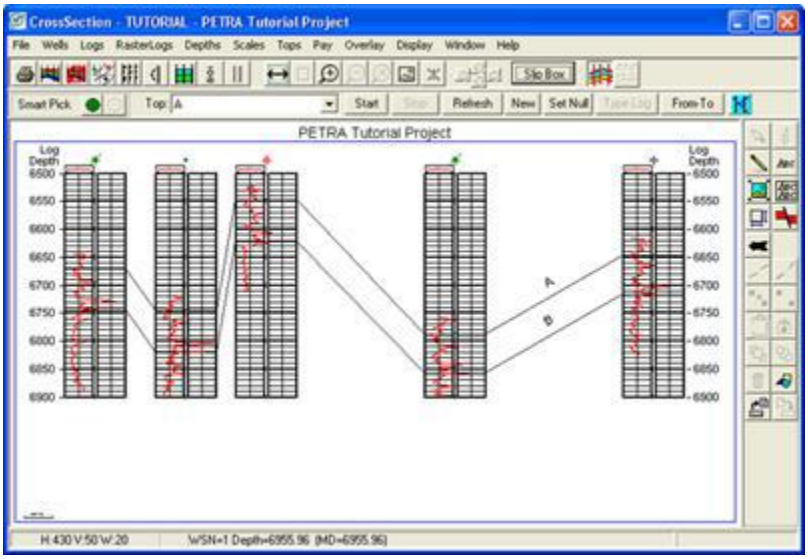
IMPORTANT: When more than one log is listed in the Selected Logs list, the scales, colors and styles, cutoffs, etcetera, apply only to the currently highlighted log name. Set the parameters for each curve by clicking on the curve and setting the scale, color, track, styles, and so forth. The settings for a curve are for all wells displayed on the cross section. You cannot define settings for each well.

3. Click the **OK** button with the green check to display the cross section with the GR curve and the two tops.



4. Click the **Depths→Depths Scale…** menu or the **Set Depths & Scale** Icon, and then click the **Depth Scale** tab. Change the Depth Scale to 50 Feet per Inch.

5. Click **OK** to redraw the screen showing the logs, log tracks, and formation tops.



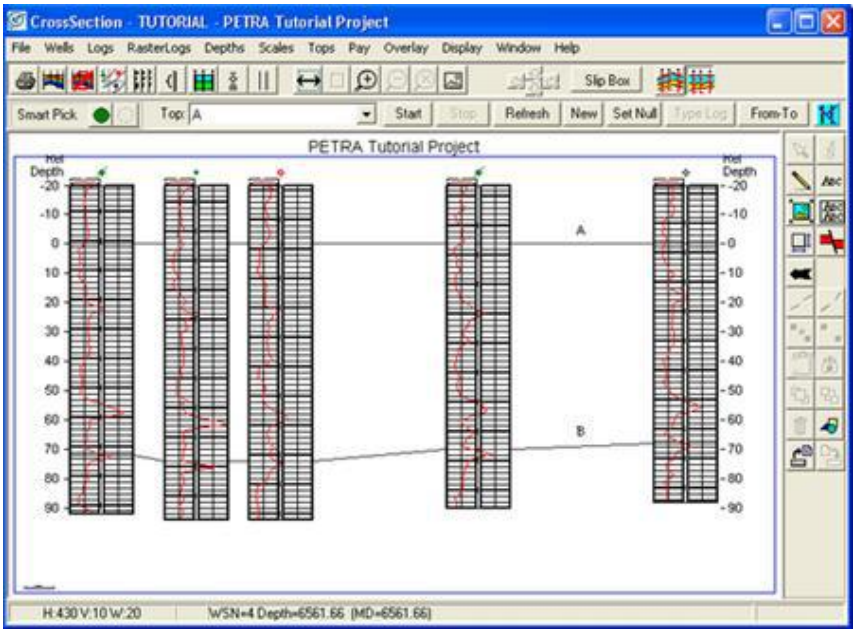
Stratigraphic cross section

Change the structure section into a flattened stratigraphic section by hanging the section on the upper A formation top.

(A)

To do this, simply right-click at the intersection of any well track and the formation top **A**. Select the **Flatten on A** menu item.

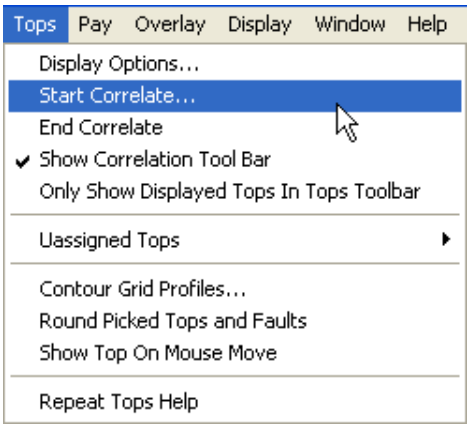
Note: If either top is missing for a well, you do not see any data displayed below the well symbol since the stratigraphic interval cannot be defined for the well.



Correlating formation tops – method 1

Correlating formation tops or markers can easily be accomplished using the cross section tool. You can adjust the depths of any displayed formation top, pick depths for the missing tops, or add new tops to the project. Typically, well logs are required to perform good geologic correlations. However, PETRA does not require logs for the correlation process.

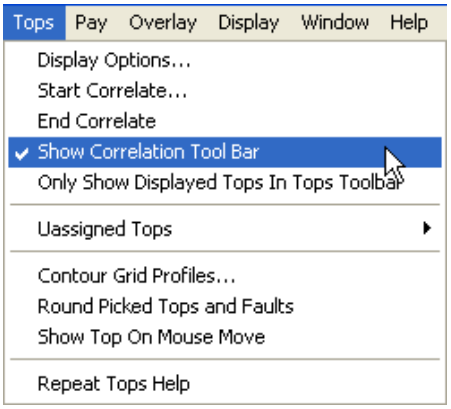
To begin correlating a top, select the **Tops→Start Correlate...** menu. The correlate dialog box displays a list containing all the formation tops.



(B)

You can also use the short-cut method by right-clicking at the intersection of a well and a top, like formation A and choosing the menu entitled **Correlate A**.

If the Correlation toolbar has been turned off, you can add the Correlation toolbar and use the options there as a short cut instead of going to the menu each time. To add the Correlation toolbar, click the **Tops→Correllation Tool Bar...** menu.



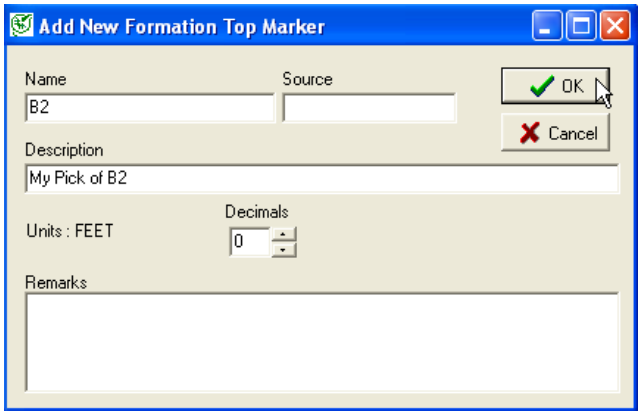
1. Click the **Tops→Start Correlate...** menu, or click the **New** button on the **Correlation Toolbar**.

The ***Select Top To Begin Correlating*** dialog screen is displayed.

2. Click the **New Top...** button.

The ***Add New Formation Top Marker*** dialog screen that is shown below is displayed.

When you click the **New** button on the **Correlation Toolbar**, the ***Add New Formation Top Marker*** dialog screen shown below is displayed.



3. For this tutorial exercise, add a new top to the project called **B2** with a description of **My Pick of B**.

4. Click the **OK** button with the green check.

   A confirmation dialog screen is displayed with the information that you entered.

5. If you want to enter another top, click **Yes;** otherwise, click **No**. For this exercise, click **No**.

   The new top appears at the bottom of the ***Select To Begin Correlating*** dialog screen, or at the bottom of the **Top** drop-down selection list if you are using the **Correlation Toolbar**.

6. Click the **B2** top name in the selection list.

   B2 is displayed in the upper right corner of the ***Select To Begin Correlating*** dialog screen or at the top of the drop-down selection list if you are using the Correlation Toolbar.

7. Either click the **Correlate** button or the **Start** button to return to the cross section and begin correlating B2.

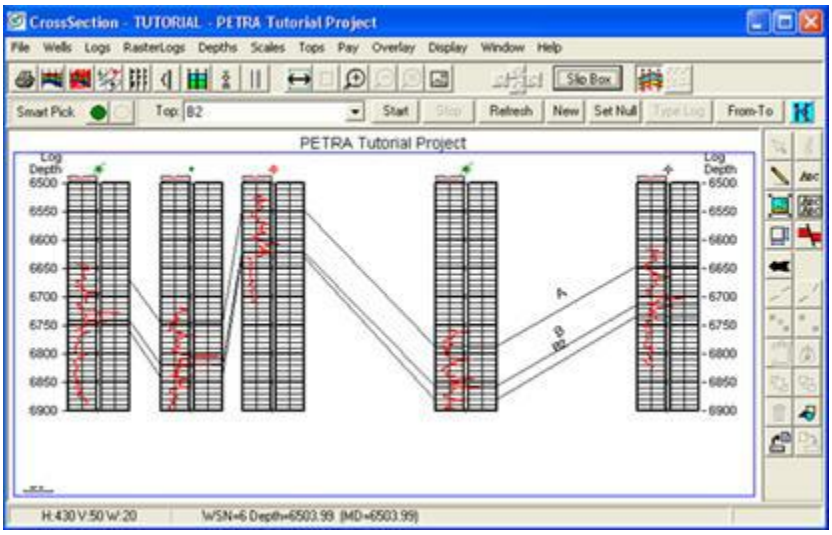
In either case, the mouse pointer becomes a cross hair indicating the correlation function is active and the name of the top is displayed in the lower right section of the status bar.

8. Position the cursor on the depth track beneath the well and a few feet below the line marking the original B top.
9. Click and hold down the left mouse button.
10. Move the cursor up and down to change the value of the top.
11. Release the left mouse button to record the final value for the B2 top for this well.
12. Repeat this process for other wells picking the B2 top just below the B top.
13. Click the right mouse button to end the correlation process.

At this point you are prompted whether or not to update the project database with the changes. Click **Yes** to update the database.

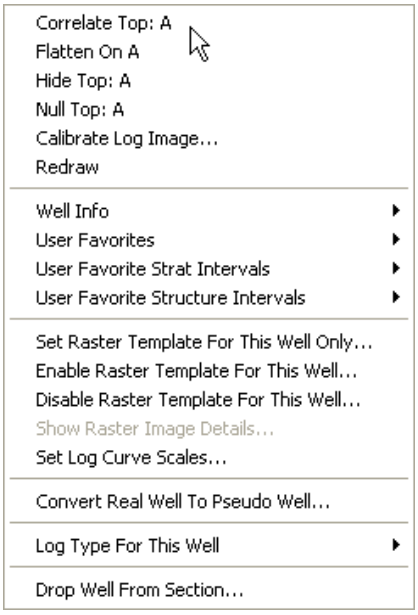
The cross section is redrawn showing the newly correlated B2 formation.

The correlation process is also terminated if you cause the screen to be redrawn through zooming or scrolling. Re-select the **Correlate Tops** icon to restart the correlation process.



Correlating formation tops – method 2

The correlation screen can also be brought up by right clicking on a well and top. The top that you select when you right click is the one set for correlating.



Cross Sections with Raster Images

PETRA Cross-Sections can display both digital log curves and/or scanned raster log images. This section describes how to straighten, calibrate, and assign a raster image to a well for display as a cross-section. All data items in the database that are available for cross-sections with digital logs are also available for posting with the scanned raster images.

Cross Section – Log Image Calibration Net Pay

Scanned raster log images, displayed in the cross section module, can show one or more color-filled intervals representing zones of pay. Also, the pay thickness for these intervals can be stored in the Zone database where they become available for posting or contouring.

The pay intervals are defined in the **Log Image Calibration** screen. You pick the top and base depths of each pay interval. A vertical guideline can be added and used as a visual aid to show where the log curves cross over the desired cutoff value.

Each defined interval is associated with a pay number and color. Pay numbers range from 1 to 100. For example, a log image might have five intervals picked, with two intervals making up pay zone 1 and the other three belonging to pay zone 2. PETRA computes and displays the thickness of each of the five intervals and stores the sum for all pay zone 1 intervals in the zone database. Likewise, the sum for all pay zone 2 intervals can be stored in the zone database. Optionally, the total thickness of all pay zones (pay 1 plus pay 2) can be stored in a total pay zone item.

Cross section – log image display options

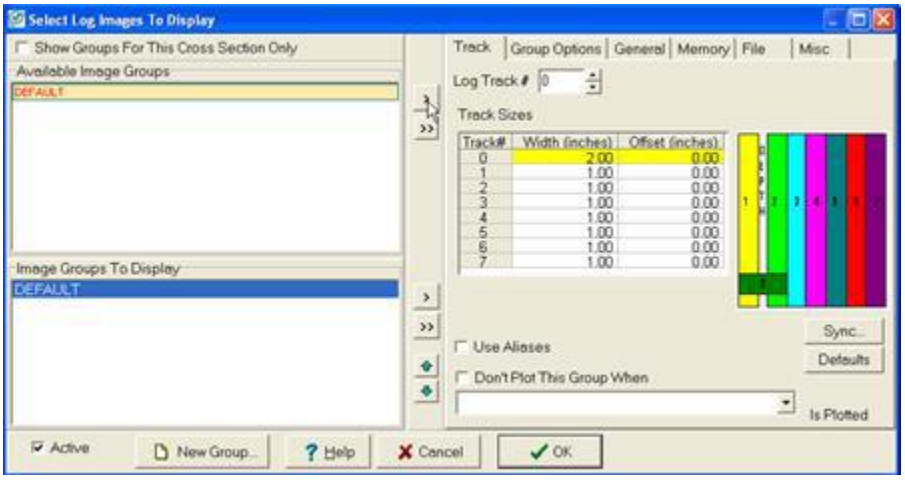
The cross-section displays log raster images for a given well by referencing group names. For example, you can display images from the GR group in track 1 and images from the Default group in track 2.

PETRA predefines one group called the Default group. You can create as many groups as you have different images for a well. Group names should normally have something to do with either the log curves they contain, such as GR or the sample rate (number of inches per 100 feet), such as 5-inch logs or 5 logs.

Note: It is permissible to use the double quotes as part to the Group name, but not for a file name. A filename can contain up to 255 characters, including spaces. A file name cannot contain any of the following characters: \ / : * ? < > |, (Back slash, forward slash, colon, asterisk, question mark, quotes, less than, greater than, and or).

Each well can have only one image in a group. However, there is no limit on the number of different groups you can define. Therefore, if you have five different log images for a well, you must have five different image groups defined. The well has one image in each of the five groups.

- In the Cross Section Module, click the **RasterLogs→Log Image Display Options…** menu.



Available image groups

This section contains a list of all defined image group names. The check box to the left of the **Show Groups For This Cross Section Only**, when clicked, displays the groups that are available for the wells that are selected for the cross section.

Double-click a group name or click it once and click the **Add Group** button button to add it to the Image Groups To Display section.

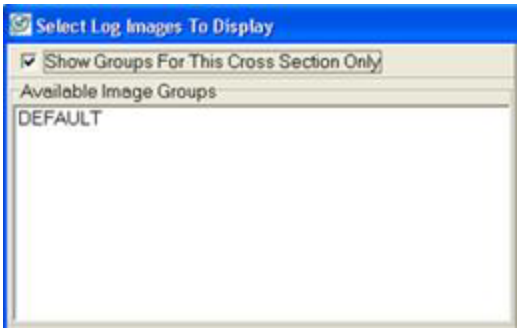
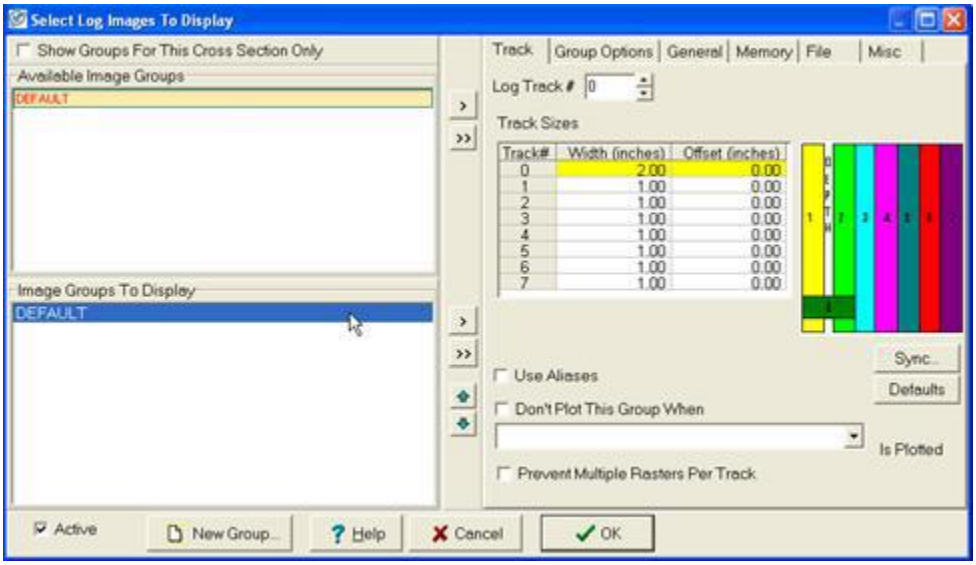


Image groups to display

This section contains a list of all image groups that are displayed on the cross section. Click to highlight a group name, and then click the **Add Group** button to add the group to the Image Groups To Display portion of the dialog screen, then set the details for the group, as described below.



Each selected image group has Group Details associated with it. Click to highlight one of the groups listed in the **Image Groups To Display** section. Then, set the appropriate detail options. Since this project only has the Default group, use the Default group.

Log Track # - This defines the image's plotting position relative to the well symbol and digital log depth track. The track positions are illustrated for convenience.

Track Width - The track width is entered in inches and determines the width of the log raster image. Typically, the track width must be set to the actual width of the paper log from which the image was scanned.

Note: Log images use the same tracks as the digital log curves. Therefore, changing the width also affects any digital curves displayed in the same track.

Adding a New Group – Clicking on the New Group button creates a New Group. You enter the Image Group Name and Image Group Description, and then click the **Add** button to add the new group name to the Log Image Groups.

Group options tab

This section applies to all image groups and contains various plotting options and conditions.

Show Pay Zones - With this option checked, any pay intervals that have been defined during the calibration process are drawn on the cross section.

Post Pay Value - With this option checked, the pay values are plotted.

Plot Pay Cutoff Lines - With this option checked, the pay cutoff lines are plotted.

Show Extra Depths Above/Below Calibrations - This section contains options for plotting extra depths above and below the calibration depths.

Aliases - This section contains options for the Group aliases.

General tab

This section applies to all image groups and contains various plotting options and conditions.

Plot Scale Header at Image Top - The section of the image that has been defined as a header appears above the log image curve section.

Plot Scale Header at Image Bottom - The section of the image that as been defined as a header appears below the log image curve section.

Note: it may be necessary to increase the size of the bottom margin if the bottom header becomes clipped.

Header and Footer Height (inches) - The amount of space to reserve for plotting the header section, both above and below the curve section. The header section is stretched to fit this height.

Float Top Header - Normally, the top header section appears just below the well symbol at the upper depth of the cross section. This option causes the top header to float with the top of the image curve section even if the image starts deeper than the upper depth of the cross section.

Draw Calibration Lines - This option draws lines across the image at the calibration depths. Use this option to compare the image calibration depths with the digital depth track.

Hide Track Grids Containing Images - This option causes digital track grids to be hidden if the track contains a log image to be displayed.

Suppress Depth Track If Image In Track 0 - The depth track that is drawn between Track 1 and 2 is not displayed if there is an image in Track 0.

Suppress Raster Image If Track Contains LAS Curve - This option is used to suppress a raster image if the track contains an LAS Curve.

Show Full Image Path Name in Status Bar - This option displays the full path to the image in the status bar at the bottom of the cross section when the cursor is placed over the image. If the path is very long, you may only see part of the path.

Plot Images From Other Completions - This option plots calibrated images from other well completions for the selected UWI/API.

Use Screen Plot Technique For Printer - This option uses the screen plot technique to plot the image on a plotter. This option may not be compatible for all plotters. Only use this option if your log images are not printing correctly, such as, they are printing as solid black. It's possible that this option could cause PETRA to crash when you try to print using an incompatible printer.

Display Image Gaps - This option displays any gaps that have been set when the image was calibrated.

Label Image Groups - This option displays the Group name at the bottom of the image.

Memory tab

The two radio buttons are used to control the options for managing how memory is used when the cross-section is redrawn

- **Reload Images From Disk –** This option reads the raster image from disk each time the image is redrawn. Use this option when there is limited disk space available for virtual memory. The image may redraw slower since the data is reloaded from disk.
- **Keep Images In Memory –** This option reads the raster image from memory each time the image is redrawn. Use of this option may require virtual memory usage.

File tab

You can load a template file or save a template file.

Misc. tab

Set the Pay Label Text Height in inches. There is a switch to set the text to Opaque.

There is an option to set the Pay Label Position.

There is a check box option to use the pay from the calibration files instead of the database pay tables.

Pay toolbar – select pay number

To select a pay number,

1. Click the drop-down list button to display a list of pay number.

2. Select the pay number you want to use.

8

3D Visualizer

3DViz connects to the PETRA tables and opens with the default screen, showing main selected wells. The 3D scene is moved and adjusted using the left mouse button to drag a point in the screen causing the scene to shift and rotate. The right mouse button is used to zoom in and out by dragging a point up to zoom in and down to zoom out. The scene may be rotated by holding down the Ctrl key and dragging a point with the left mouse button. Pan is accomplished by using the middle mouse button or by using the Shift key and left click dragging. If a well is highlighted in the Main screen, all other wells displayed are dimmed.

Mouse Control

Double Click on a well to select the well in the Main screen.

Do this…	To…
Left Click and Drag	Rotate and move scene
Right Click and Drag Up	Zoom In
Right Click and Drag Down	Zoom Out
Ctrl + Left Click and Drag	Rotate Scene
Shift + Left Click and Drag	Pan Scene
Middle Click and Drag	Pan Scene

Keyboard Shortcuts

Key stroke…	Result
F2	Seismic Editing Mode (Adjust Seismic Planes)
F4	Adjust View to Horizontal
F5	Refresh Data From Tables & Restores Default View
F6	Restore Default View
Ctrl + x	Axis Options
Ctrl + e	Extent Options
Ctrl + f	Frame Options

Ctrl + o	Display Options
Ctrl + c	Clear All
Ctrl + Alt + c	Clear Screen
Ctrl + d	Display All
Ctrl + l	Set Light Position
Ctrl + w	Set Data Limits to Full Extent
Ctrl + a	Selects All Wells in Database
+	Zoom In
-	Zoom Out
z	Zoom Off
Ctrl + ←↑→↓	Rotate the scene in the selected direction
Shift + ←↑→↓	Pan the scene in the selected direction

Hot Keys for Display Options

w	Show as wireframe
s	Show as solid

Vertical Tool Bar Buttons

Bore Holes

Tops

Shows

Perfs

Logs

Dip Meter Log

Add Grid

Load Petra Overlays

Add Petra Map

Cross Section

Add Plane Depth or Time

Seismic Data

Seismic Arbitrary Line

Add Seismic Horizon

Seismic 2D Lines

Horizontal Toolbar Buttons

Save Current View

Restore View

Restore Default View

Clear Screen

Refresh All Data from Disk

Search Well by WSN

Set Extent

Set Vertical Exaggeration

Display Map View Window

Display Front View Window

Please note the following:

Only PetraSeis/Seismic Data can be displayed in Time Mode. To display wells properly in time mode, a velocity function is required for each well. Time mode is selected by clicking **Display->Mode->Time.**

Multiple Grids and multiple Cross Section images may be displayed at the same time. Each Grid or Cross Section appears in the Layers list box.

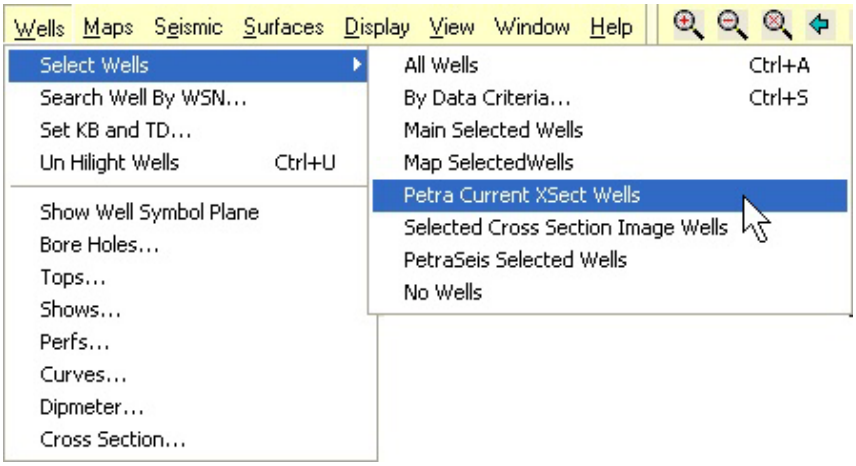
The latest Video/OpenGL driver may need to be installed or a Floating Point Error may be encountered.

- Double click the layer item to change the properties of that layer.
- Uncheck the layer to hide it.
- Select the layer, and then click the **Remove** button (**X**; at top of screen) to remove the layer from the list.

Selecting Wells/Bore Holes

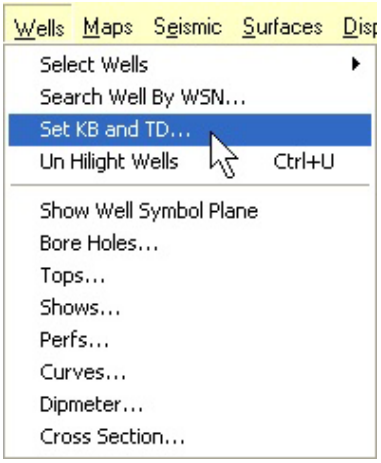
When initializing the 3D-Viz module, by default all bore holes selected in the main module are depicted. However, similar to other PETRA modules, the wells to be illustrated may be selected based on various data criteria: a WSN list or wells currently selected for display in other subject modules.

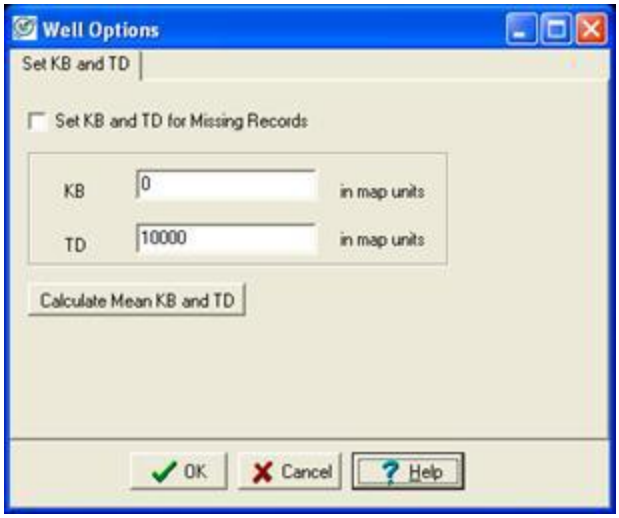
Note: All depth information is required to be subsea for the 3-D viewer. In addition, all bore holes are required to have a Kelly Bushing or other datum (which is referred to as KB) and Total Depth Z value in order to be displayed.



If wells are not depicted due to the lack of a Kelly Bushing or Total Depth, a KB and TD can be computed by selecting the **Wells** dropdown, **Set KB and TD…**, checking the box adjacent to **Set KB** and **TD for Missing Records**.

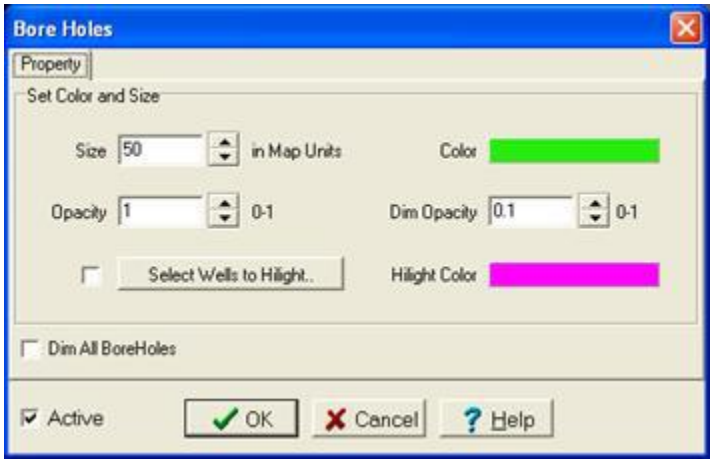
Please note KB and TD values can be calculated using the mean KB and TD or user specific values. Please see the screen captures below.





Bore Holes

Bore Hole characteristics are determined by selecting the button or the **Wells** dropdown, and then **Bore Holes**. **Bore Holes** are displayed as tubes of the specified diameter, color and opacity.



The **Opacity** and **Dim Opacity** are used to highlight a selected **Bore Hole** by dimming all except the selected well. It may also be useful to dim all the wells for a better view. Note the Bore Hole toolbar button has a popup menu allowing all wells to be dimmed.

1. Select **Wells to Highlight**:

2. Click to select wells by data criteria.

   The selected wells can be plotted with a different color than the other boreholes.

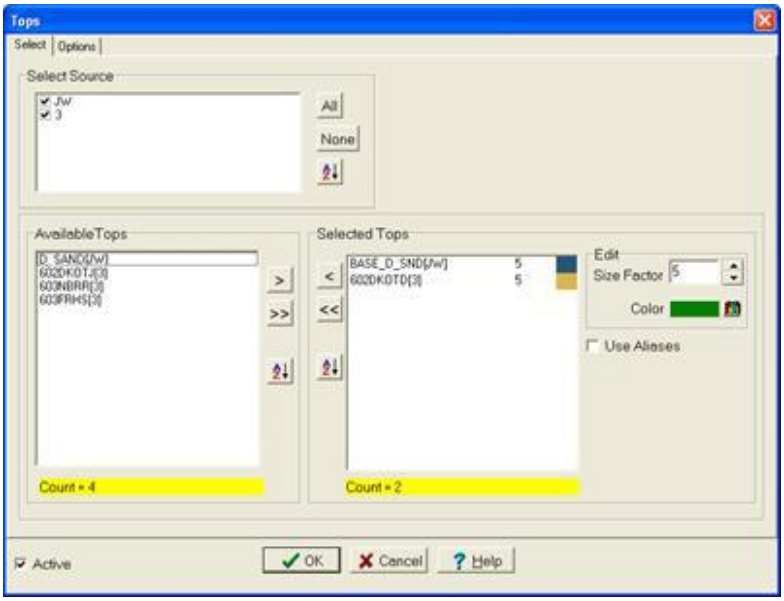
   The boreholes can be un-highlighted by un-checking the check box.

Tops

The ***Tops*** dialogue box is selected by pressing the button or the **Wells** drop-down menu, and then **Tops…** The ***Tops*** dialog allows the user to select a group of formation tops for display on the well bore.

As shown below, the available tops are shown on the left and the selected tops on the right. The control buttons may be used to move the selection between the list boxes. The selected tops are first shown using a default random color value. These colors may be changed (see below).

Select Tab:



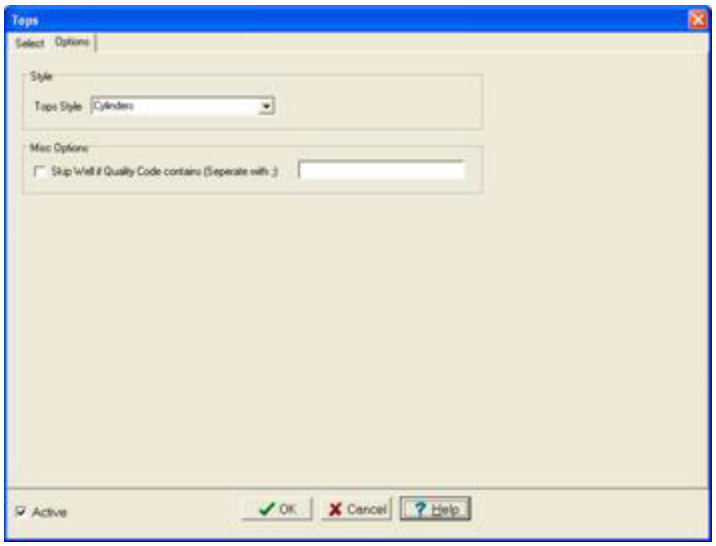
The Select Source control may be used to sort the Available Tops by source.

Once the tops are selected, the color and size may be changed. The tops are shown as discs with the diameter borehole diameter times size factor.

- To change the size, highlight the desired selected tops, and then change the size factor.

- To change the color, select the top or tops desired, and then click on the change color button.

Options Tab



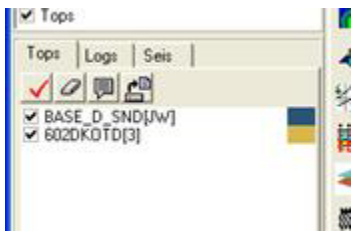
Tops Style—Select the desired top's display style (cylinders/disc/ticks)

Skip Well if Quality Code Contains—Enter one or more values, separated by a semicolon to indicate tops that are **not** to be plotted on wells that have matching quality codes defined for those tops.

The Selected Tops list is shown below the Layers list in the Legend Box and has controls to check all ( ) or hide all ( ).

There is also a button to display the Tops property dialog. The Refresh Tops button ( ) updates tops from the data base.

Click on the check box of each top to show or hide the top.

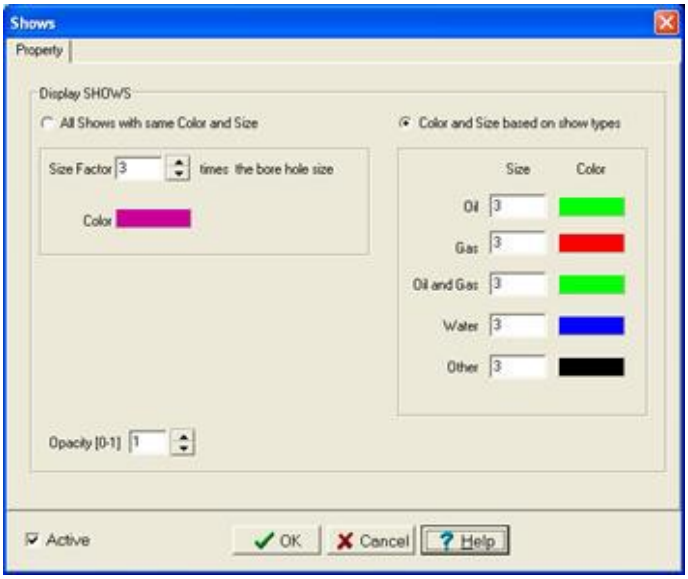


Any top can be highlighted by first selecting it in the legend box, and then clicking the right mouse button to display a popup menu.

Click **Hilite** to highlight a selected top, and **Clear Hilite** to unselect the top.

Shows

The **Shows** dialog box is accessed by selecting the button or **Wells** drop-down menu, and then **Shows…** This dialog box controls the size and color and opacity of cylinder for the various shows.

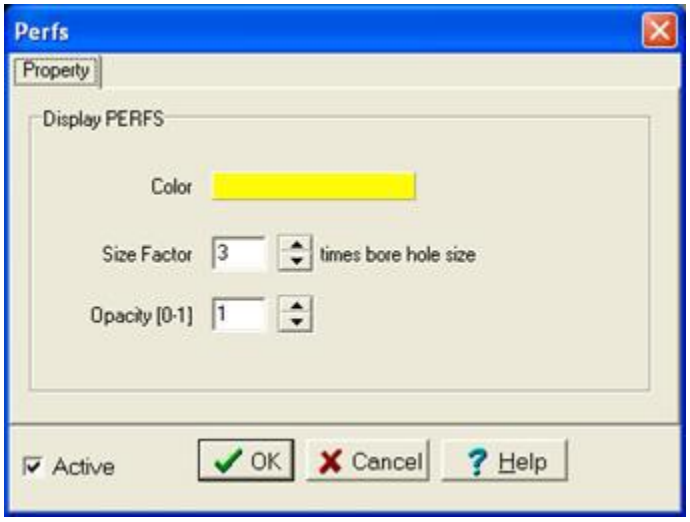


The size is a multiplier based upon the size of the bore hole parameter.

The color for each show is based upon the hierarchy shown. For example, if shows were Oil and Water, the color would be the Oil color.

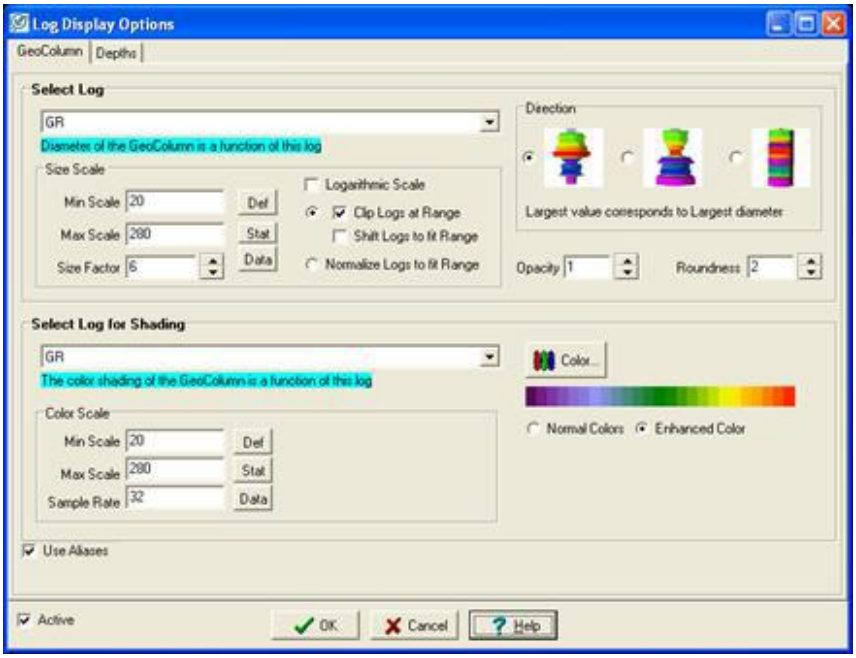
Perfs

The **Perfs** dialog box is accessed by selecting the button or the **Wells** dropdown and **Perfs…** The Perfs may be shown along the bore hole as colored cylinders on the bore. Select the color, size, and opacity desired for the Perfs display.



Curves/Logs

The **Curves/Logs** dialog box is accessed by selecting the button or **Wells** drop-down well, and then **Curves**… A **digital log** may be shown on the well bores.



The log is drawn around the borehole based on a scale factor that is directly relational to the size of the bore hole. The curve is then colored corresponding to a selected color Range (or palette) for any desired log.

Size Factor—determines the maximum size of the log based upon the bore hole diameter.

Logarithmic Scale—check this option to plot a log using log 10 value. The left and right scales should be entered as powers of 10 when using this option.

Clip Logs at Range—checking this option causes the log trace to be truncated at the track boundaries whenever the log value is beyond the range defined by the min and max scale.

Shift Logs to Fit Range—checking this option shifts the data of the selected log such that the mean value of the log trace coincides with the mean value of the selected range defined by the min and max scale.

Normalize Logs to Fit Range—check this option to normalize selected log data to fit the range defined by min and max scale.

Note: While **Normalize Logs to Fit Range** is selected, the clipping and shifting log trace option is disabled and vice-versa.

Direction—determines the dimension for the largest log value.

Opacity—set the opacity of the logs ranging from 0(transparent) to 1(opaque).

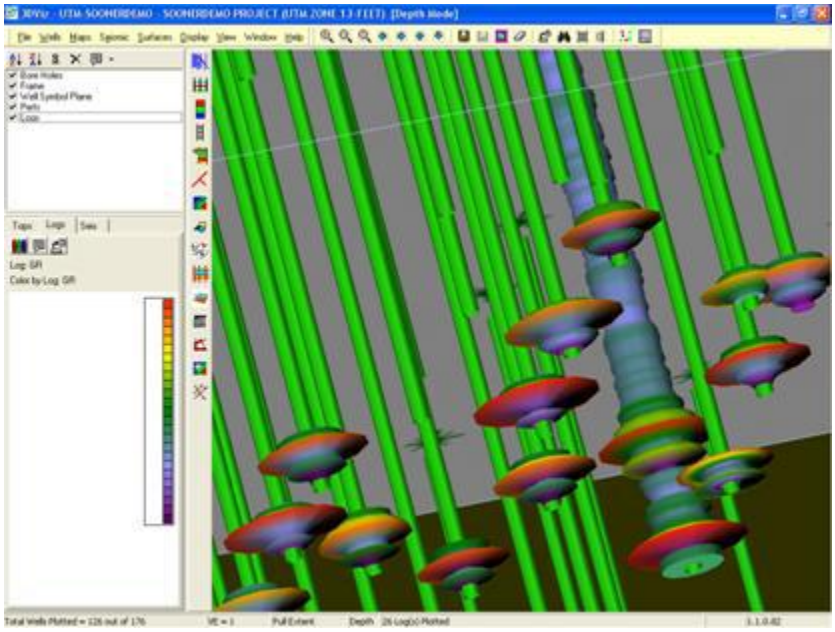
Roundness—set the roundness (vs. hexagonal) of the logs ranging from 1(minimum) to 6(maximum).

Color—the **Shading** log is used to determine the colors of the depth values of the log curve. This defaults to the same log that is used for the diameter scaling. Select another curve to show a combination of attributes, one as diameter and the other as color.

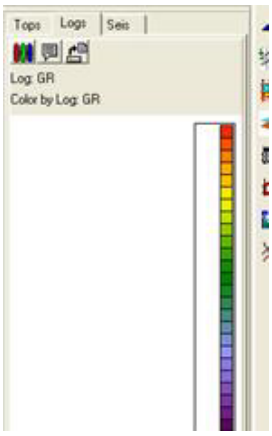
The color **Min Scale** and **Max Scale** default to the values in the log curve.

The **Sample Rate** is used to resample the log curve for clarity of color.

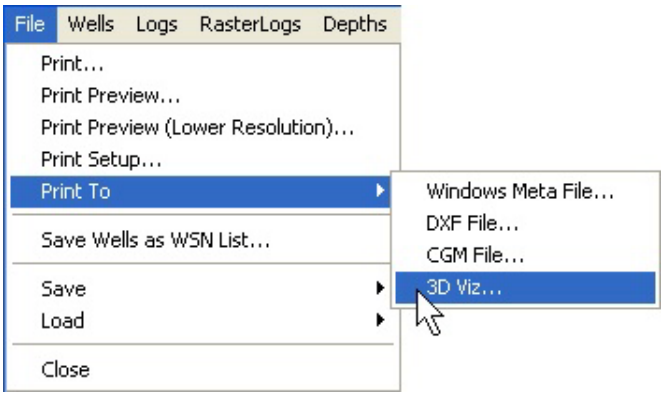
Choose the type of **Color** bar desired, and then click the C**olor** button to select the desired colors.



The **Logs** box shown below shows the current color palette used to display the selected digital log. There are two buttons used for changing the Log properties and changing the colors. The prompts to the Log Display Options and the refreshes the log image(s).

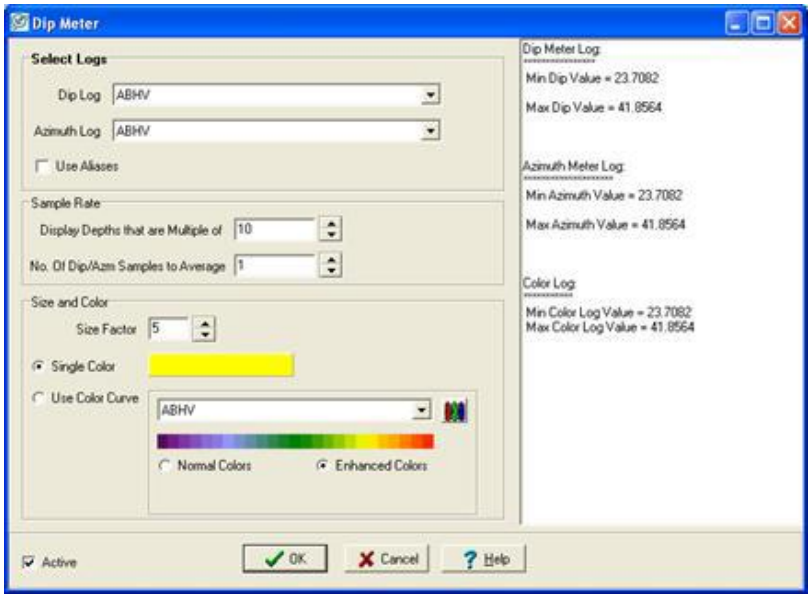


Note: RasterLogs can only be displayed in the 3D-Visualiser via the cross section module, meaning the Raster Logs have to be displayed in a cross section and printed to **3D Viz…** The illustration below shows the methodology for printing to **3D Viz** while in the cross section.



Dip Meter

The ***Dip Meter*** dialog box is accessed by selecting the button or the **Wells** drop-down menu, and then **Dipmeter…** Digital logs having Dip and Azimuth data can be displayed as directionally tilted disks.



Use Aliases—check to include aliases for the logs.

Sample Rate—**Display Depths that are Multiple of**—disks are displayed at the depth increment specified by this field.

No. of Dip/Azm Sample to Average—total number of samples to average on either side of the target depth to calculate an average Dip and Azimuth for the target depth to display. (For example, disks will be displayed at every 10 unit depth increments by averaging 5 sample points on either side of it).

Size Factor—determines the size of the discs based upon the bore hole diameter.

Color—disks can be colored using a single color or multiple colors by selecting any curve. Click to select the desired color scheme.

Grids

The ***Display Grids*** dialog box allows you to

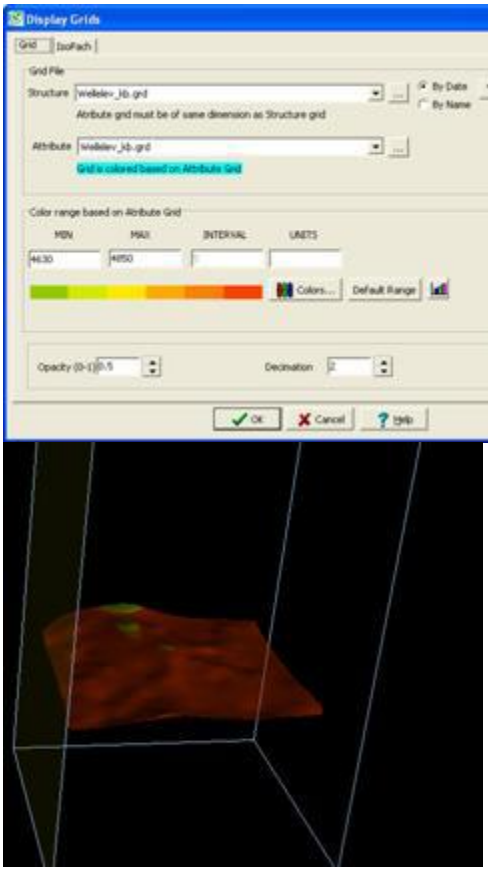
- Display PETRA structure grid (or fault plane derived from creating a grid).
- Display Isopach.

Display Grids is displayed by selecting a PETRA structure grid (depth) and an attribute grid (color). The attribute grid defaults to the structure grid, although a different attribute

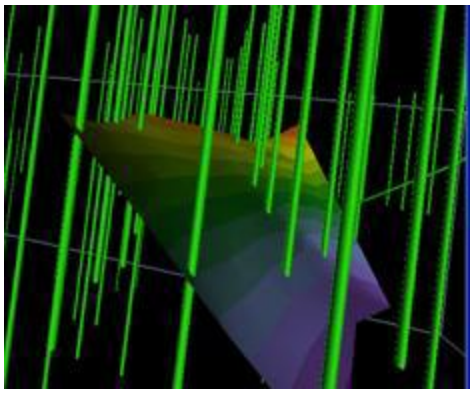
grid may be selected. The attribute grid must have identical grid characteristics as the structure (same size and bins).

The colors for the attribute grid may be changed and the opacity may be adjusted.

The color of the right side Information box changes to reflect rectangular grid (white) or triangular grid (yellow) or incomplete grid (red).



To display a **fault plane** from a fault cut in 3D-Visualiser, fault cuts must be saved to formation tops and then a grid is created from the formation top. This is accomplished in the Main Module by selecting **Compute-> From Formation Tops-> Extract Fault Gaps to Fm Tops**, and then in the mapping module a grid is created from the fault gaps that were sent to the Fm Tops. Once this grid has been created, follow the steps below to display the grid (fault plane).



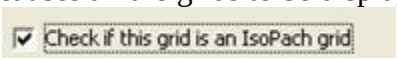
An Isopach is displayed by selecting either two structural grids of the same size and bins or by selecting one upper structural grid and a PETRA Isopach grid.

Both grids must be the same size and bins and the grids must be rectangular as well.

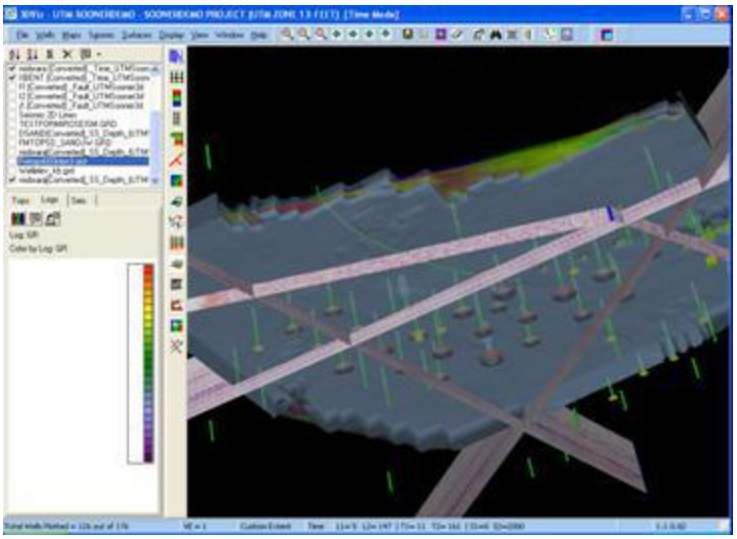
Note: In Petra grids can be **Resampled to Match** and grids can be converted from **Triangular to Rectangular in the Map Module**. Click **Map Module->Contours dropdown->Grids->(Resample Grids to Match… or Convert Triangular to Rectangular Grid..).**

On selecting an Upper Grid, the Lower Grid List Box is filtered to include only the grids that are at lower elevation than the upper grid and of same size and bins.

To select a PETRA Isopach Grid, check "Check if this grid is an Isopach grid," which causes all the grids to be displayed. You can then select the desired grid.

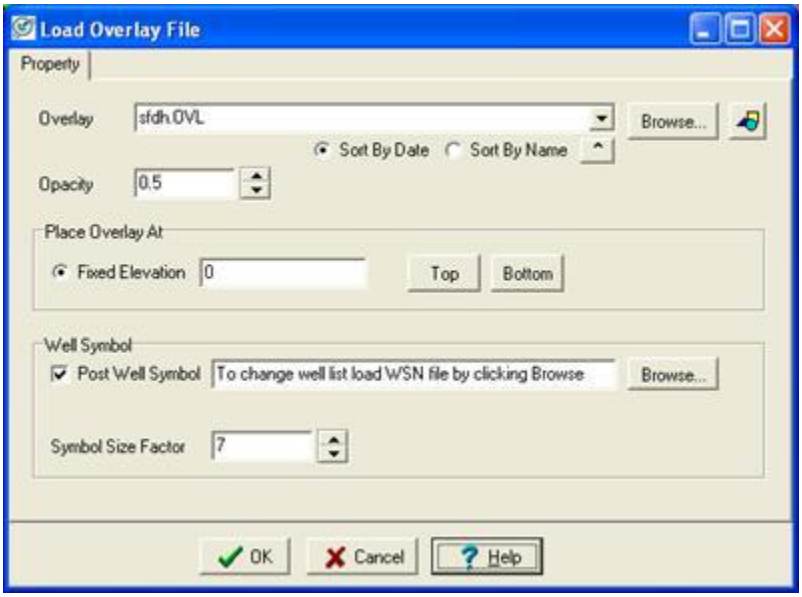


Select desired color and opacity for display.



Load Overlay File

The ***Load Overlay File*** dialog box is accessed by selecting the button or the **Maps** dropdown and **Load Overlay File…** A PETRA overlay file may be displayed at a specified depth on the 3D display.



The opacity may be set anywhere from transparent 0 to opaque 1.

1. Click to change Overlay Preferences.
2. Click the **Top** or **Bottom** button to set the elevation to display the overlay.

   The Position value may be changed to position the overlay at any position.

   The value shows time when in time mode.
3. Check **Post Well Symbol** if you are placing well symbols on the overlay.
4. To post well symbols different from the wells selected in 3DViz, **Browse** to desired **WSN List File**. If no WSN List File is selected then symbols are plotted for the 3DViz selected wells.

   The symbol size factor controls the size of the well symbol.

Petra Map/Map Images

The ***Petra Map*** dialog box is accessed by selecting the button or the **Maps** drop-down menu, and then **Load Petra Map…** Map images generated by the PETRA map module may be displayed at a specified elevation on the 3D display.

Map images can be created in Petra Mapping module by going to **File->Print To->3DViz Image**.

The map images contain a well list which may be used with the image by checking the Load Wells from Image check box.

The opacity may be set anywhere from transparent 0 to opaque 1.

Click the **Top** or **Bottom** buttons to set the elevation to display the image. The value may be changed to position the map image at any elevation. The **Place Map At** changes to time when in seismic.

Cross Section

The ***Cross Section*** dialog box is accessed by selecting the button or the **Wells** drop-down menu, and then **Cross Section…** The cross section options control the display of saved cross section/fence diagram images from PETRA or the location of the current cross section. Multiple cross section images may be shown, generating a fence diagram.

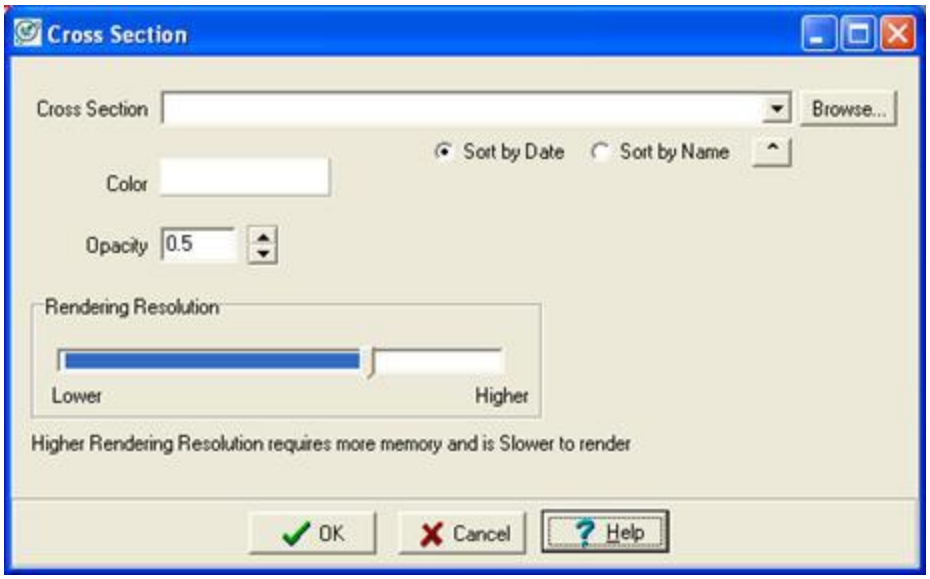
Cross Section images (of extension X3D) are shown in the combo box if they are in the existing PETRA project. Click the **Browse** button to find and load cross sections saved to another location.

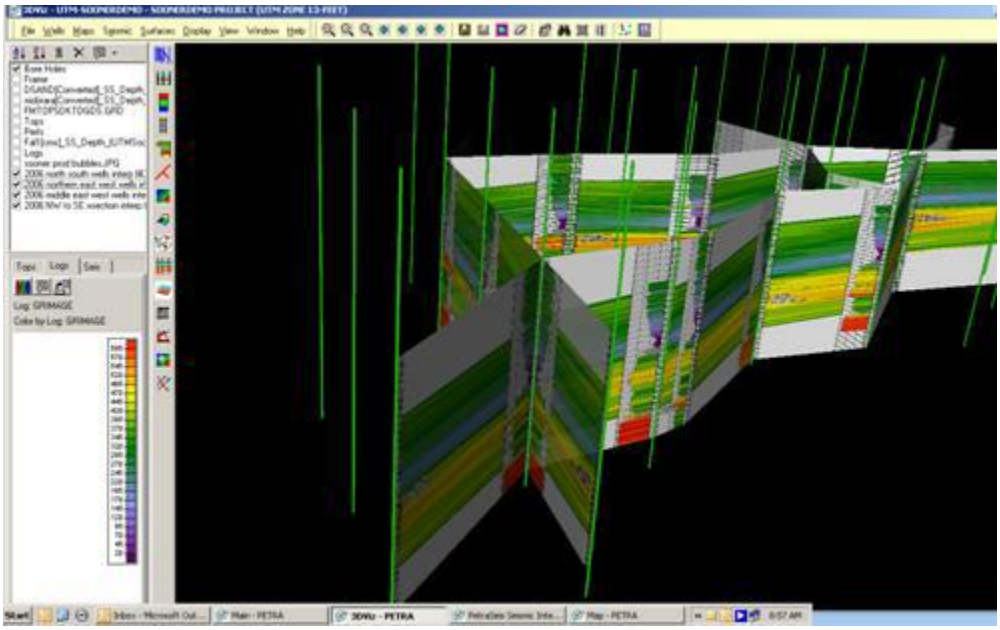
The Cross Section images have to be created in Petra Cross Section Module.

Note: Please note that **only structural cross sections with depth set as subsea** can be viewed in 3DViz. After creating a structural cross section in the Petra Cross Section module go to **File->Print To->3DViz...** to create [.X3D] files.

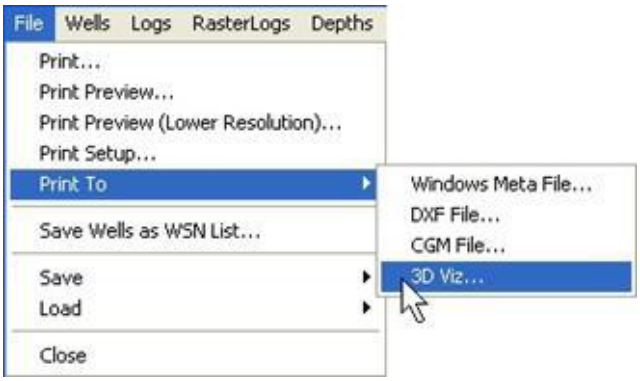
Set the **Opacity** and **Rendering Resolution** as desired.

Note: The higher the resolution, the more memory required and the slower it renders.



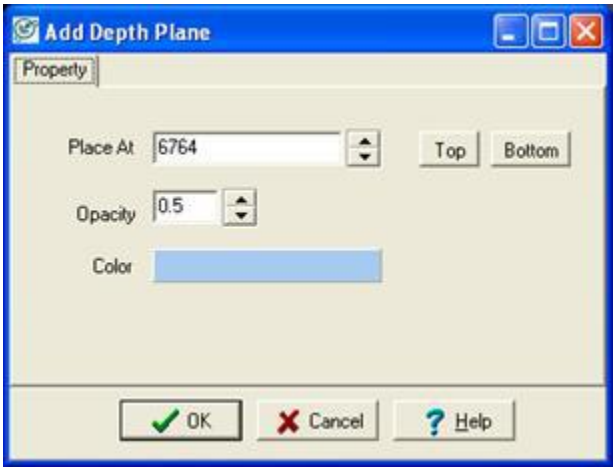


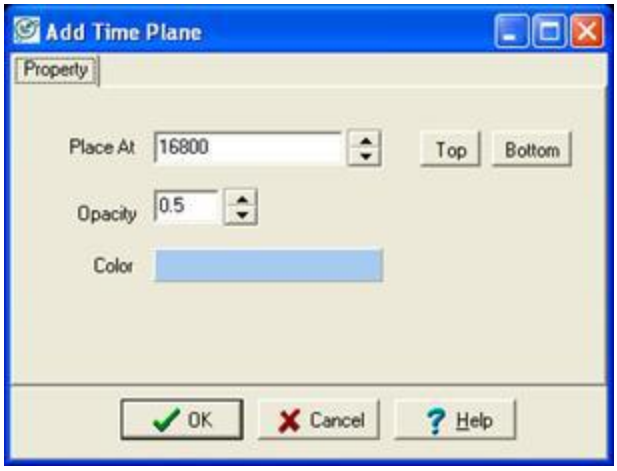
Raster Logs can only be displayed in the 3D-Visualiser via the Cross Section module, meaning the Raster Logs have to be displayed in a **Cross Section** and printed to **3D Viz…** The illustration below shows the methodology for printing to 3D Viz while in the Cross Section module.



Depth/Time Plane

The ***Add Depth Plane*** or ***Add Time Plane*** dialog boxes are accessed by selecting the button or **Surfaces** dropdown, and then **Depth or Time Plane…** The Depth or Time Plane options control the position, color and opacity of planes that can be plotted as depth markers.





Note: The **Surfaces** drop-down box prompts you to choose the type of plane to insert based on the current mode selected. The **Depth** or **Time** mode is chosen by selecting the **Display** drop-down menu, and then double clicking either **Depth** or **Time**.

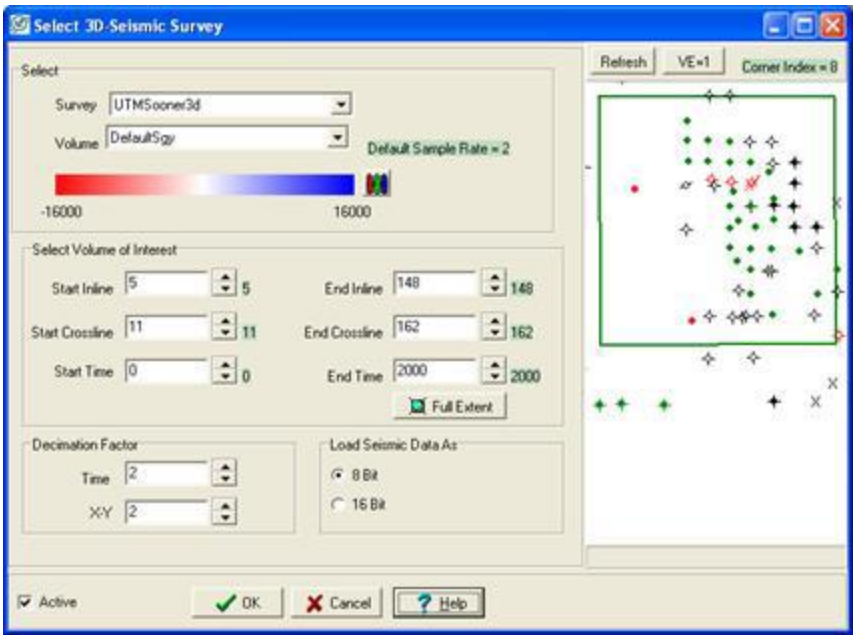
Multiple horizontal planes can be plotted at desired depths.

1. Set the **Opacity** and **Color** as desired.

Seismic Cube

When you load seismic data, the 3D Viz display automatically changes to time mode.

The ***Select 3D-Seismic Survey*** dialog box is accessed by selecting the button or the **Seismic** drop-down box, and then **Seismic Cube…** The 3D-Seismic data is displayed as a cube where its sides can be easily translated and rotated to get multiple views of the Seismic data.



1. Select **PetraSeis 3D Seismic Survey** and **Volume** from the drop-down boxes.

2. Click to set color bar. The outline of the **3D Survey** is displayed in the right region.

3. Select **Volume of Interest**—Select inline, crossline and time extents to limit the seismic display of the area of interest. This helps to render fast results.

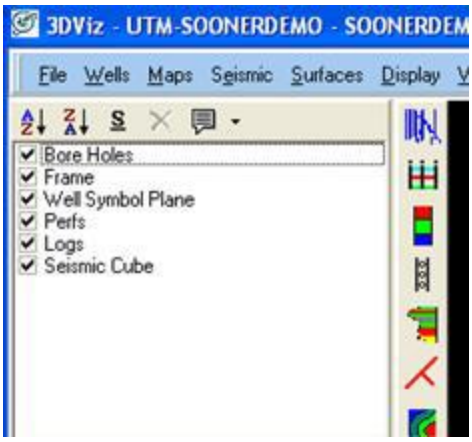
4. Click to extend the display limits to Full 3D Survey extents.

   Decimation Factor—Seismic 3D data can be decimated in both time and XY extents to reduce memory storage needed to render the data.

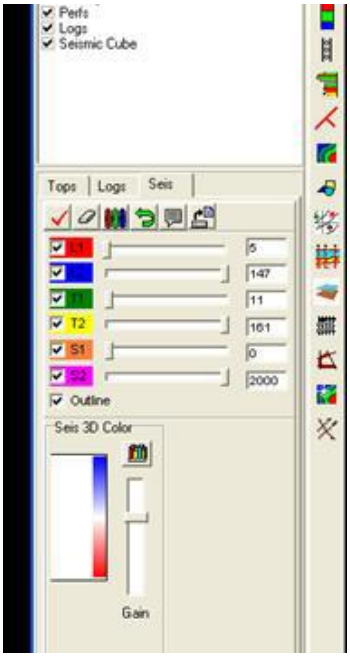
   Load Seismic data As—Seismic 3D data can be loaded as a 8 bit or 16 bit integer value.

5. When you click **OK**, the seismic cube is displayed.

   A [**Seismic Cube**] entry is added in the Layers list. The visibility can be controlled by checking it on or off.



A Seismic Legend [Seis] is also added in the Legend Box to control the seismic cube properties.



L1, L2: Planes along the Inline direction.

T1,T2: Planes along the Crossline direction.

S1,S2: Time Slices.

6. To increase color intensity increase the gain of the **Seis 3D Color** bar.

7. Right click at any track bar to reset the selected plane (or all planes) position to default or Hilite/Un-hilite the selected plane or to change the plane outline colors.

1. Type directly at the white boxes adjacent to the track bars of the respective planes to display quickly the inline, crossline, or slice of interest.

   Seismic Cube Planes can be translated by

   - Dragging the respective track bars of the planes
   - Dragging the planes directly in the viewer

2. Press hot key [**F2**] or click at in the top toolbar. The button changes to and the status bar color changes to sky blue

3. Holding middle mouse button down, click at the center of any of the 6 planes and drag to move it.

   Once the middle mouse button is released, the button changes back to. No planes can be interactively translated after that.

4. Press the hot key [**F2**] or click again to drag the planes interactively.

5. To rotate Seismic Cube Planes, press the hot key [**F2**] or click at in the top toolbar. Hold the middle mouse button down, and then click at the edge of any of the 6 planes and drag to rotate it.

6. Click to RESET all plane positions and to reset colors to default.

Note: Please note that only PetraSeis 2d or 3d Seismic Data can be displayed in **Time mode**.

1. Select **Time** mode by clicking **Display->Mode->Time.**
2. To show seismic values, left click and hold [**F2**] to get cross-hairs. The value is shown on the toolbar.

Seismic Arbitrary Line

The ***Select Seismic Arbitrary Lines*** dialog box is accessed by selecting the button or the **Seismic** drop-down menu, and then **View Arbitrary Line…** Seismic Section along any arbitrary line can be displayed by first creating Combo/Arb Line in PetraSeis and then selecting the line(s) to display using the dialog below.

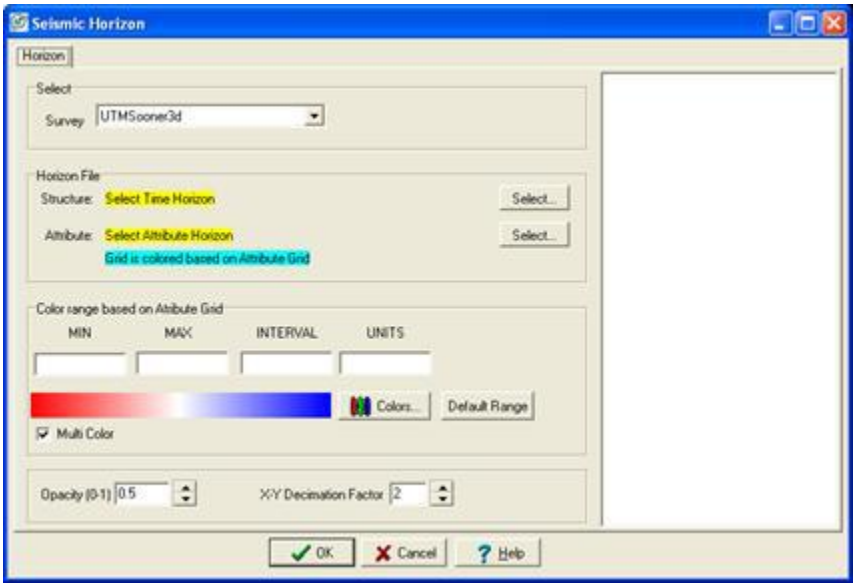
2. Select single or multiple Combo/Arb lines, and then click **OK** to display.

   The selected Combo/Arb line(s) are clipped to the selected seismic survey in 3DViz. Thus a combo line created in PetraSeis that covers multiple surveys is clipped to the extent of 3DViz Seismic Survey.

Note: Seismic data (seismic cube) must be loaded prior to display seismic arbitrary line displays.

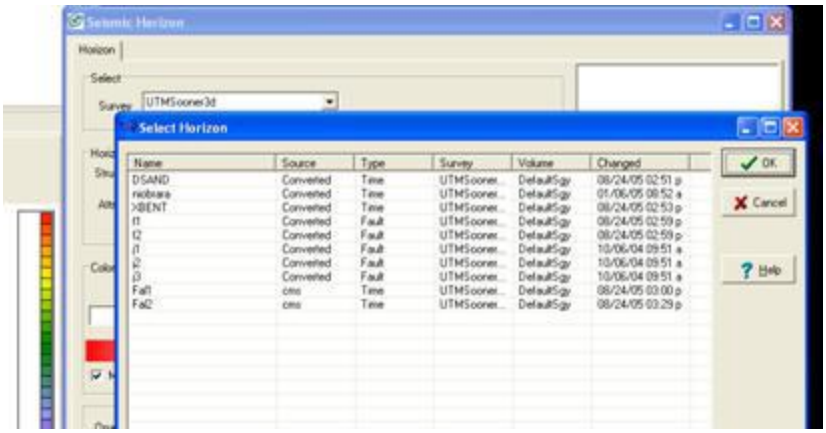
Seismic Horizons

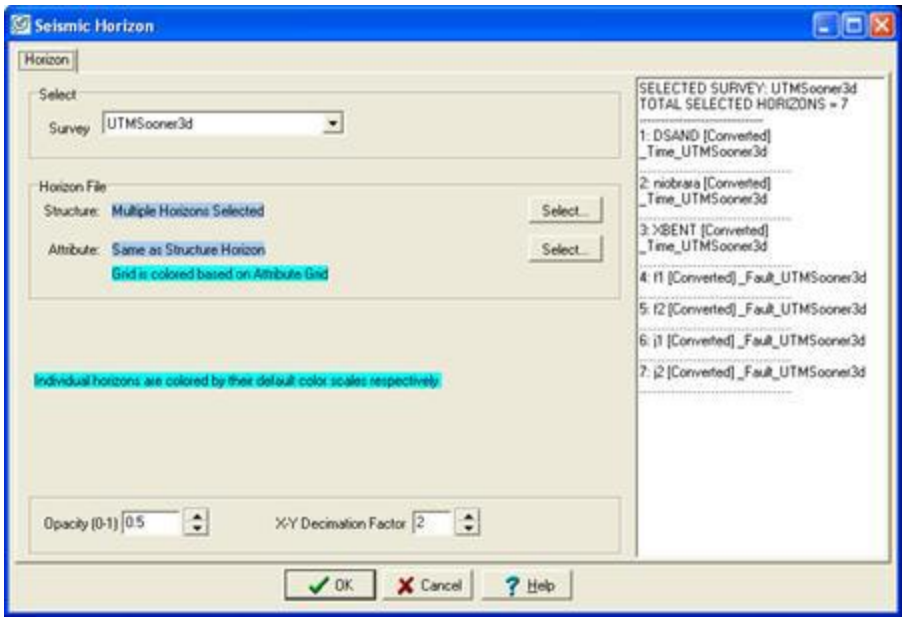
The ***Seismic Horizon*** dialog box is accessed by selecting the button or the **Seismic** drop-down menu, and then **Seismic Horizons…** Seismic Horizon is displayed by first selecting a **PetraSeis Survey,** and then selecting **Structure** (time/fault) horizon and an attribute horizon (color). The attribute horizon defaults to the structure horizon, although a different attribute horizon may be selected.

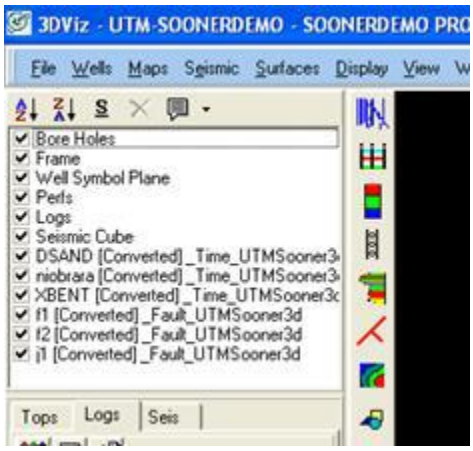


The **Colors** for the attribute horizon may be changed and the **Opacity** may be adjusted.

- Click the **Select** button in the ***Seismic Horizon*** dialog box to select horizons. Single or multiple horizons can be selected and plotted.







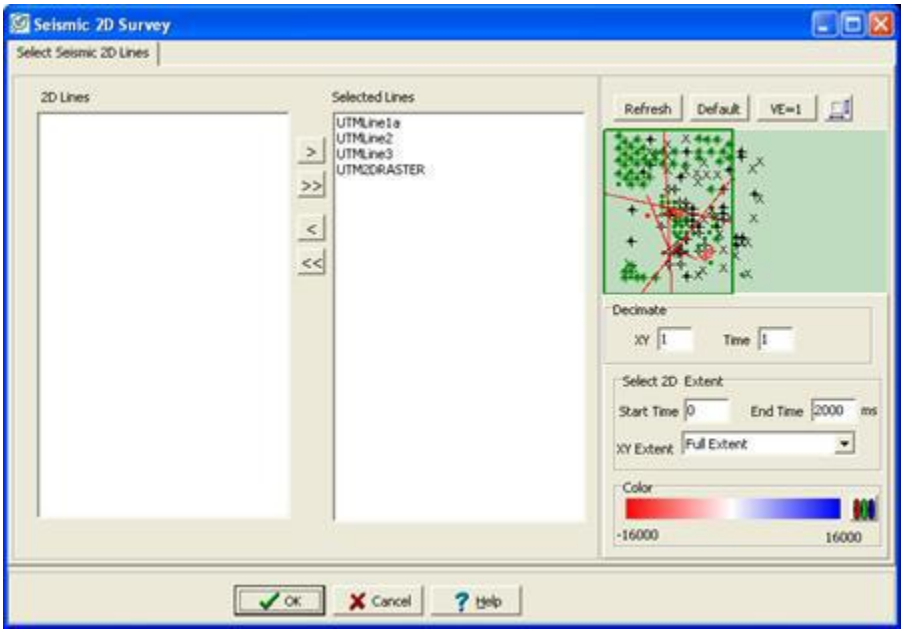
Note: Please note that Seismic Horizons can only be displayed in Time Mode (**Display-> Mode-> Time**).

In PetraSeis, time horizons may be converted to SS depth, and then converted to PETRA Grid Files, which can be shown in depth mode.

Seismic 2D Survey

Seismic data automatically changes to Time Mode.

PetraSeis 2D-Seismic data can be displayed using the button or the Seismic drop-down menu, and then 2D Lines.



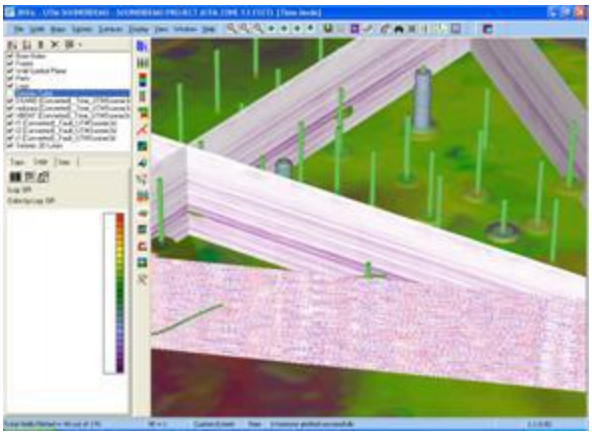
- Select 2D lines (right side) from the available 2Ds.

  The selected 2D Lines are displayed (red color) on the right side panel along with well locations. The green line outlines the XY display extent.

  Decimate—The Seismic 2D data can be decimated by specifying XY and time decimate factors.

  Select 2D Extent—Specify start time and end time to limit 2D seismic data to the time interval of interest.

  The XY display extent can be set manually using the combo box **XY Extent**.



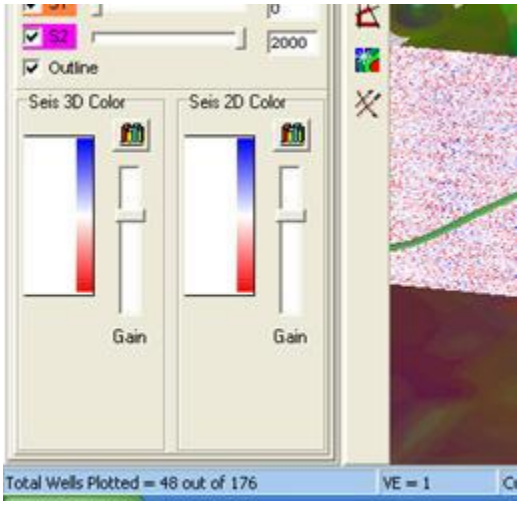
1. Display extent of the 2D lines can be also be set graphically by clicking and then drawing a rectangle to select the region of interest. The green line outlines the selected display extent.

2. **Color**—Select color bar using .

3. Vertical exaggeration can be set by clicking .

4. Click to restore default extents and to refresh drawings on the right panel.

   A Seismic 2D Legend [**Seis**] is also added in the Legend Box to control the seismic 2D Lines properties.



Note: Please note that seismic 2d lines can only be displayed in [**Time Mode**] (**Display-> Mode-> Time**).

Save Current View

- To Save Current View select the button or **Display** drop-down menu, and then **Save Current View**.

Restore Current View

- To Restore Current View, select the button or **Display** drop-down menu, and then **Restore Current View**.

Restore Default View (F6)

- To Restore Default View, select the button or **Display** drop-down menu, and then **Restore Default View**—restores default position scheme.

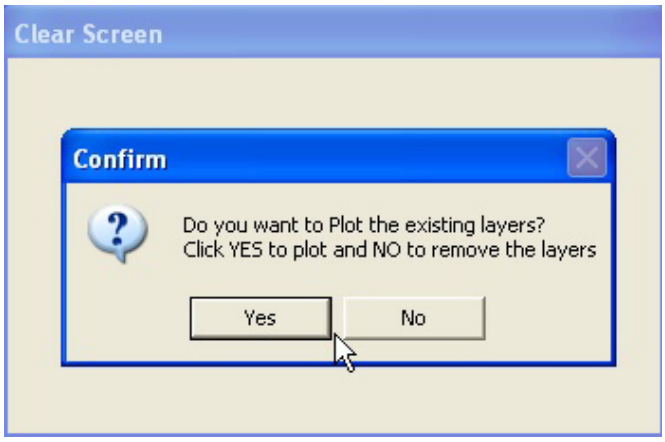
Restore Default Window Settings

- To Restore Default Window Settings, select the **Display** drop-down menu, and then **Restore Default Window Settings**.

Clear Screen

The Clear Screen option is accessed by selecting the button or **Display** drop-down menu, and then **Clear Screen**. When Clear Screen is selected, the following window is displayed.

- Click **Yes** to recover previously displayed images or **No** to remove existing layers.



Refresh All Data (F5)

- To Refresh All Data select the button, or click the **Display** drop-down menu, and then select **Refresh All Data**, or press **F5**.

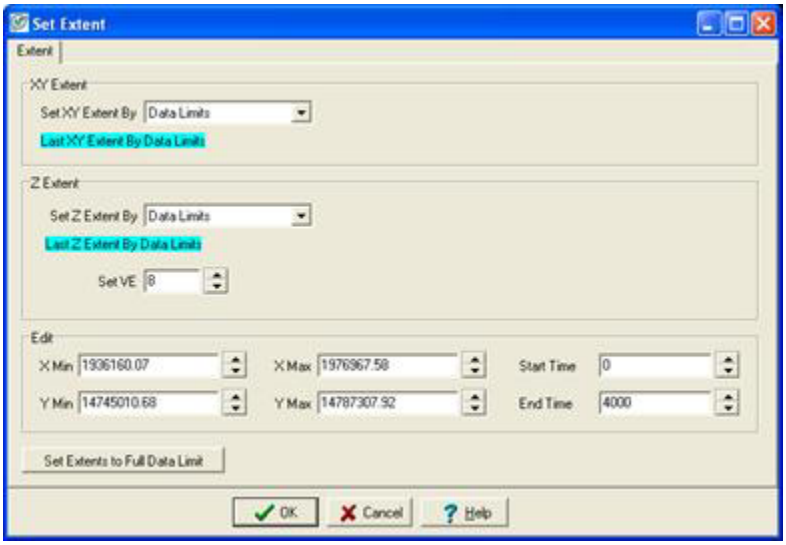
Note: The original screen extents are displayed.

Search Well by WSN

- To Search Well by WSN, select the button or the **Wells** drop-down menu, and then select **Search Well by WSN…**

Set Extent

- Access the ***Set Extent*** dialog box by selecting the button or the **Display** drop-down menu, and then **Set Extent…** Use the ***Set Extent*** dialog to adjust the default X, Y, and Z extents of the display.



It may be necessary to change the extents after selecting a different well list or grid file.

The XY Extents and the Z Extents combo boxes may be used to set the extents from some entry in the Layers.

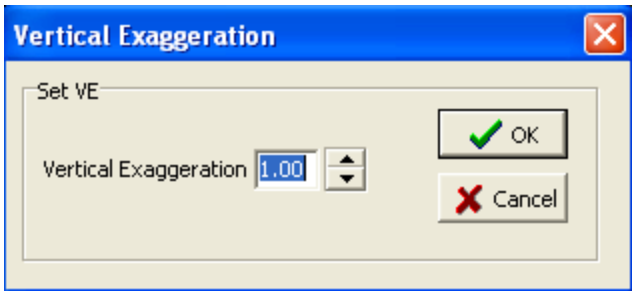
Set Data Limits to Full Extents

- Access Set Data Limits to Full Extents by selecting the **Display** drop-down menu, and then **Set Data to Full Extents**.

  This zooms out the display to view the entire area of data.

Set Vertical Exaggeration

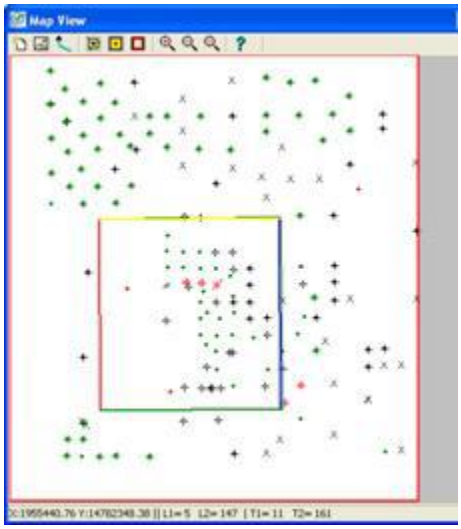
- Access the ***Vertical Exaggeration*** dialog box by selecting the button or the **Display** drop-down menu, and then **Set Vertical Exaggeration…**



Map View

- Access the Map View window by selecting the button or the **View** drop-down menu, and then **Map View**.

  The Map View is a window showing the XY extents of the visualizer and the selected wells.



The Map View may be used to

- Highlight the wells in a rectangular area.
- Select multiple highlighted wells (left mouse button + Ctrl Key) or wells within a rectangular area.
- Set XY Extent to a rectangular area.

Note: the rectangular area below with a white background.

To select the white rectangular area,

1. Hold the **Ctrl** key down, and then draw a rectangle using the right mouse button pressed down.

   The selected rectangular area can be moved in the scene by using the Shift key and holding the middle mouse button down.

2. Move the mouse over the red lines on the edges of the map until the cursor changes, and then click and drag the line to the desired location. This must be repeated for each side.

3. Use Zoom-In button to draw a rectangle to Zoom to a rectangular area.

4. Use Zoom-Out button to zoom to the previous level

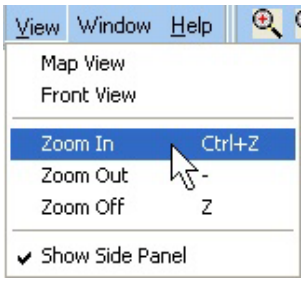
5. Use Zoom-Off button to un-zoom

6. Click the tool bar buttons to highlight, and then select the **Wells** drop-down, and then **Set XY Extent**.

   A particular well may be highlighted in the visualizer by clicking it in the Map View window. Multiple wells can be highlighted by clicking wells holding the **Ctrl** key down. Double clicking shows the PETRA Main module with the well selected.

Toolbar buttons are also available for setting the Map View to the current extents , or refreshing the window.

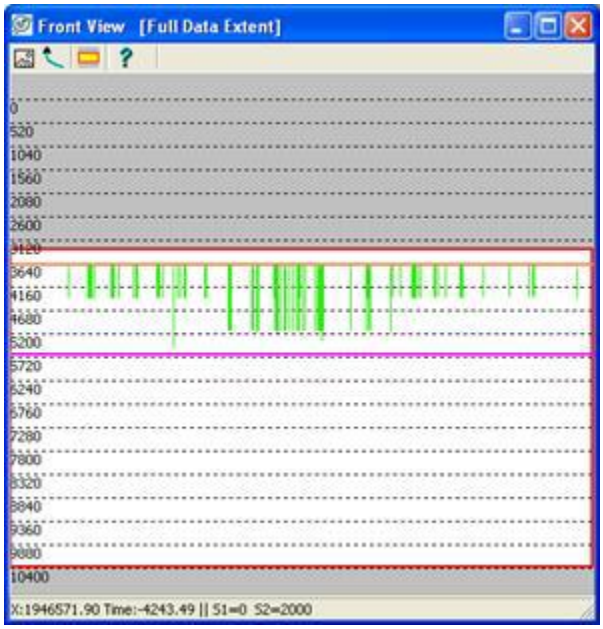
Note the XY coordinates in the status bar. X:1955440.76 Y:14782348.38



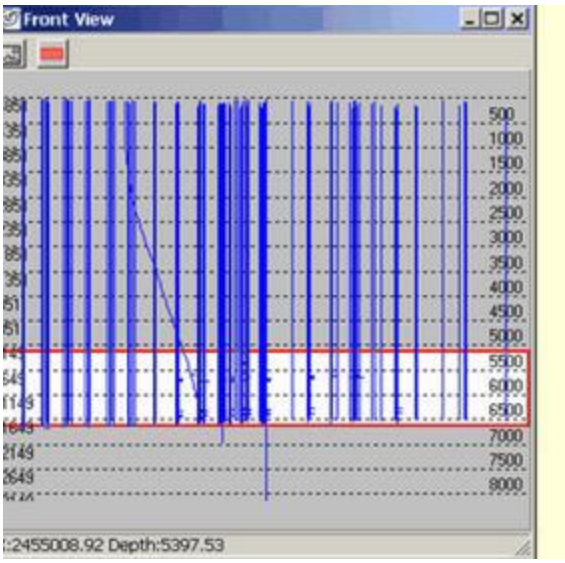
Front View (Full Data Extent)

- Access the Front View window by selecting the button or the **View** drop-down menu, and then **Front View**.

  The Front View window shows the XZ view of the wells and tops. It can be used to set the Z extents graphically by dragging the red lines to the desired position and clicking the right toolbar button to set the visualizer Z extents.



Directional surveys can be displayed by choosing .



Note the X coordinate and the Depth or (Z coordinate) as the mouse is moved within the window.

Mode

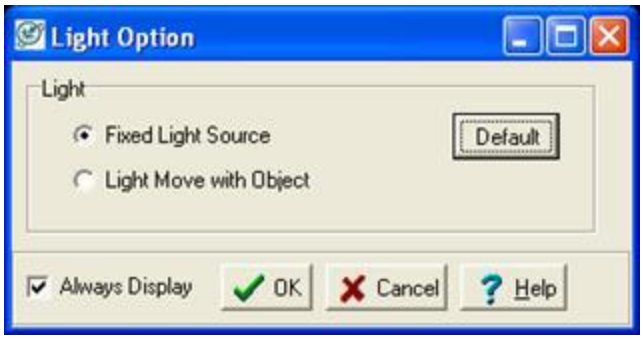
1. Access the ***Depth*** or ***Time Mode*** dialog box by selecting the **Display** drop-down menu, and then **Mode.**
2. Choose **Depth** or **Time.**

Set Light

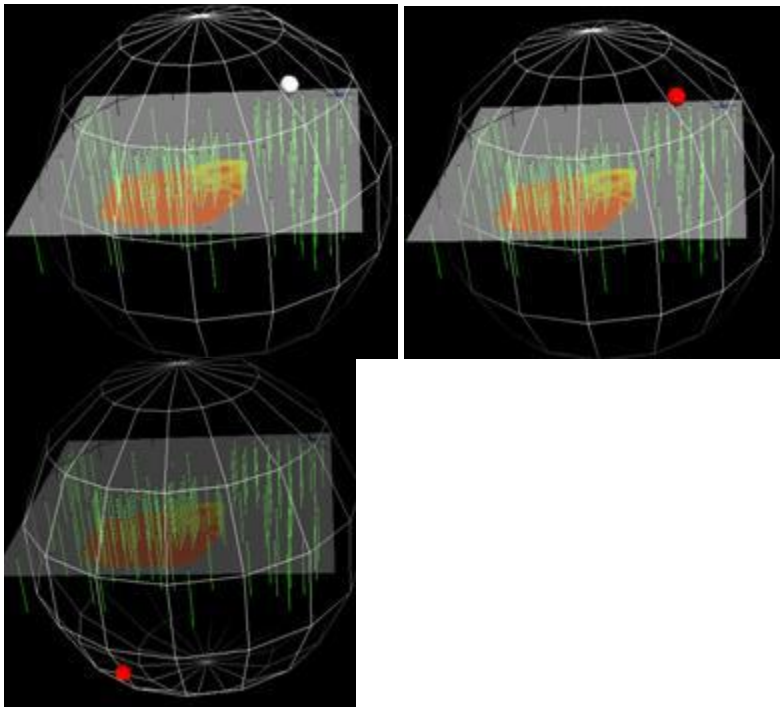
- Access the ***Light Option*** dialog box by selecting the **Display** drop-down menu, and then **Set Light…**

  You can select a Fixed Light Source or Light Move with Object. The light source can be relocated by selecting (single left click) the white sphere (it highlights red) and dragging the sphere to the desired location.

Note: In the event the extents (typically the vertical exaggeration) are set unrealistically to establish the globe surrounding, the below warning is displayed. To resolve this issue, reset the extents or vertical exaggeration by selecting the **Display** drop-down menu, and then **Set Extent…**



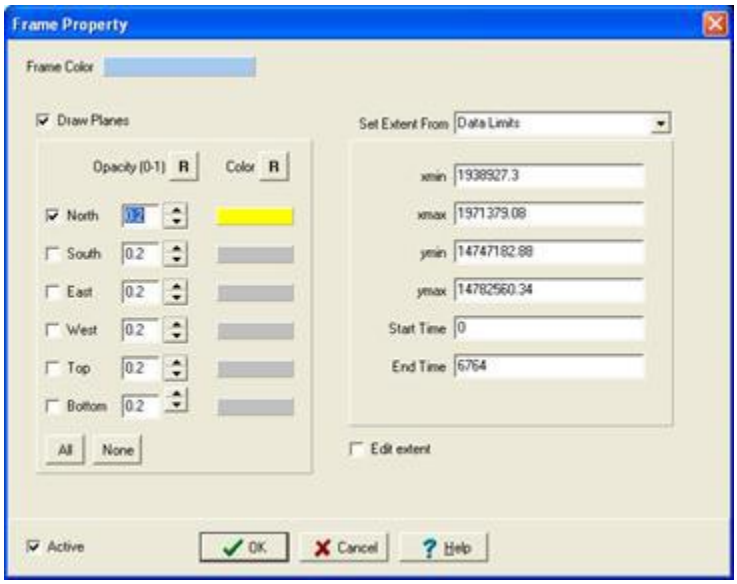
WARNING
Unable to set light as the current extent is too narrow
Hint: Please go to Display->Set Extent menu to view the current extent
OK



Frame Options

- Access the ***Frame Property*** dialog box by selecting the **Display** drop-down menu, and then **Frame…**

Frame Options are used to draw lines at the corners of the cube bound by the extents. They can also be used to position semi transparent planes on the sides of the cube.



Frame Color—Select the desired color for the frame.

Draw Planes—Switch causing the selected planes to be shown.

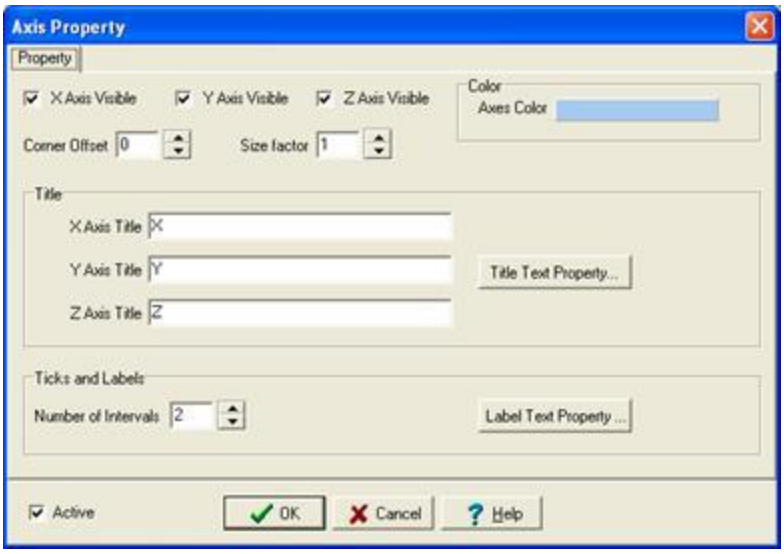
Extents—Control the XYZ extents of the frame only.

The default Frame has the North Face colored with a semitransparent color as shown. This is useful for determining North Orientation of the Cube.

Axis Property

- Access the ***Axis Property*** dialog box by selecting the **Display** drop-down menu, and then **Axis…**

  The Axis dialog is available to select parameters for labeling the X, Y, and Z axis.



Axis Visible check boxes control which of the Axis display.

Corner Offset—determines the distance the axis line is from the cube corner (zero is on the corner).

Size Factor—is a text scaling parameter for the labels.

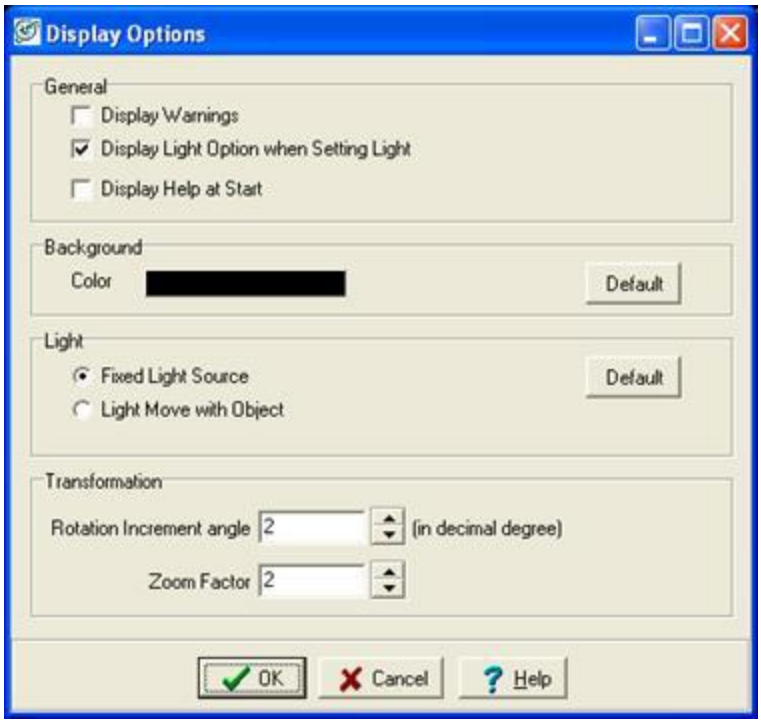
Title—determines the text plotted along the selected axis.

Ticks and Labels—controls the number of labeled points along each axis.

Options

- Access the ***Display Options*** dialog box by selecting the **Display** drop-down menu, and then **Options…**

  Display options control various project parameters shown below.



Display Warnings—lists warnings and errors encountered while plotting the display.

Display Light Option when Setting Light—switch for displaying Light Option Dialog when setting Light.

Display Help at Start—if checked, then **Help** is always displayed at the start of the application.

Background Color—change to modify the background color of the visualizer.

Fixed Light Source—light is fixed relative to the observer.

Light Move with Object—light source is fixed relative to the object.

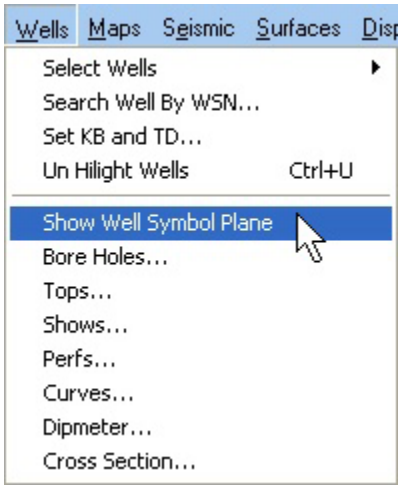
Rotation Angle—number of degrees the image rotates with each button or key press.

Zoom Factor—multiplier used for toolbar button zooming.

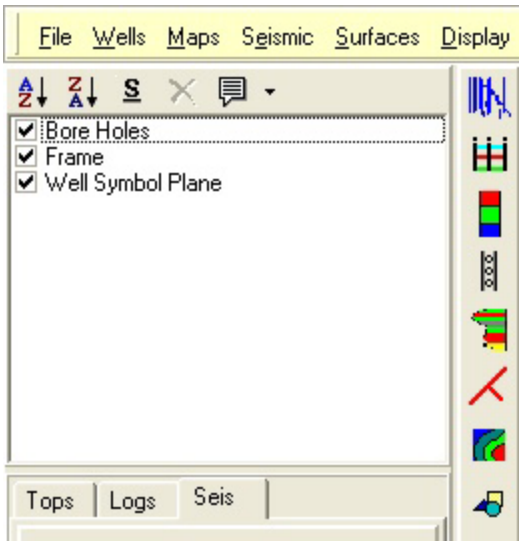
Save as Default Display options—save current display options as Default display options. This applies to all the projects of the current user. For example, if the user wants **White** as default background color, then clicking this button while selecting a White background sets white as the default background color.

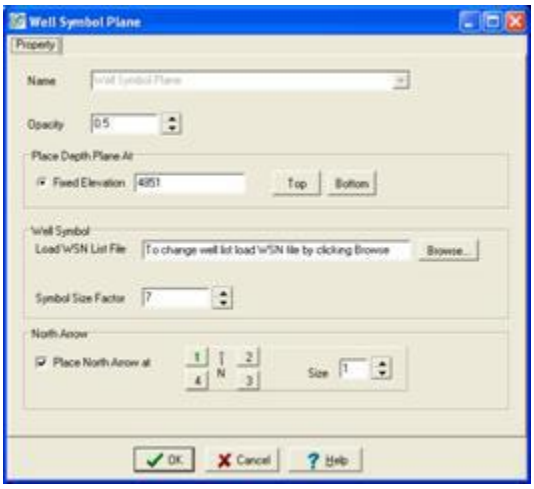
Show Well Symbol Plane

To display well symbols and the **north arrow** on the well symbol plane, select the **Wells** dropdown, and then **Show Well Symbol Plane.**



Note: Please note a layers list to turn off/on the well symbol plane is displayed after selecting the Show Well Symbol Plane.



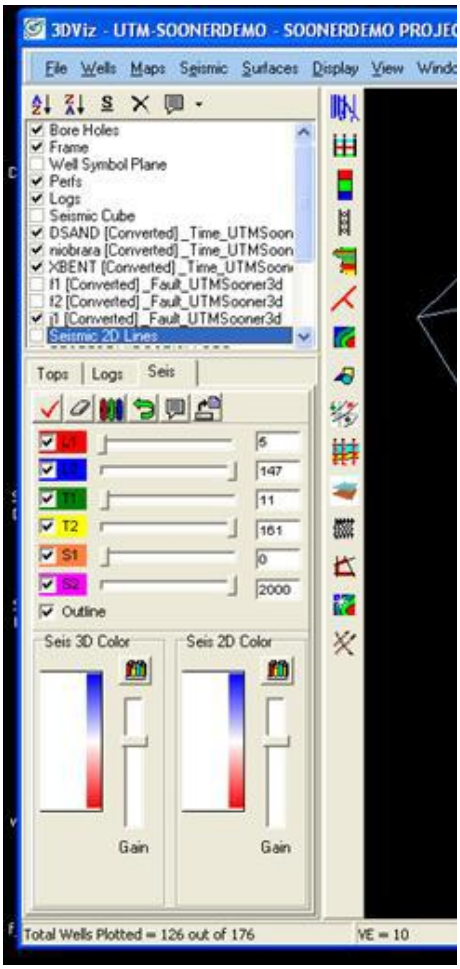


A double left-click on the layer in the layer list, Well Symbol Plane, activates the window to select the attributes for the well symbol plane.

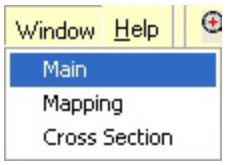
Note: The plane may only be placed at upper most extents.

Show Side Panel

- To Display/Hide the Side Panel (active layer box, and the Tops, Logs, and Seis tabs), select **View** and **Show/Hide Side Panel**.



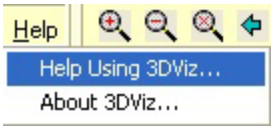
Window Drop-down Menu



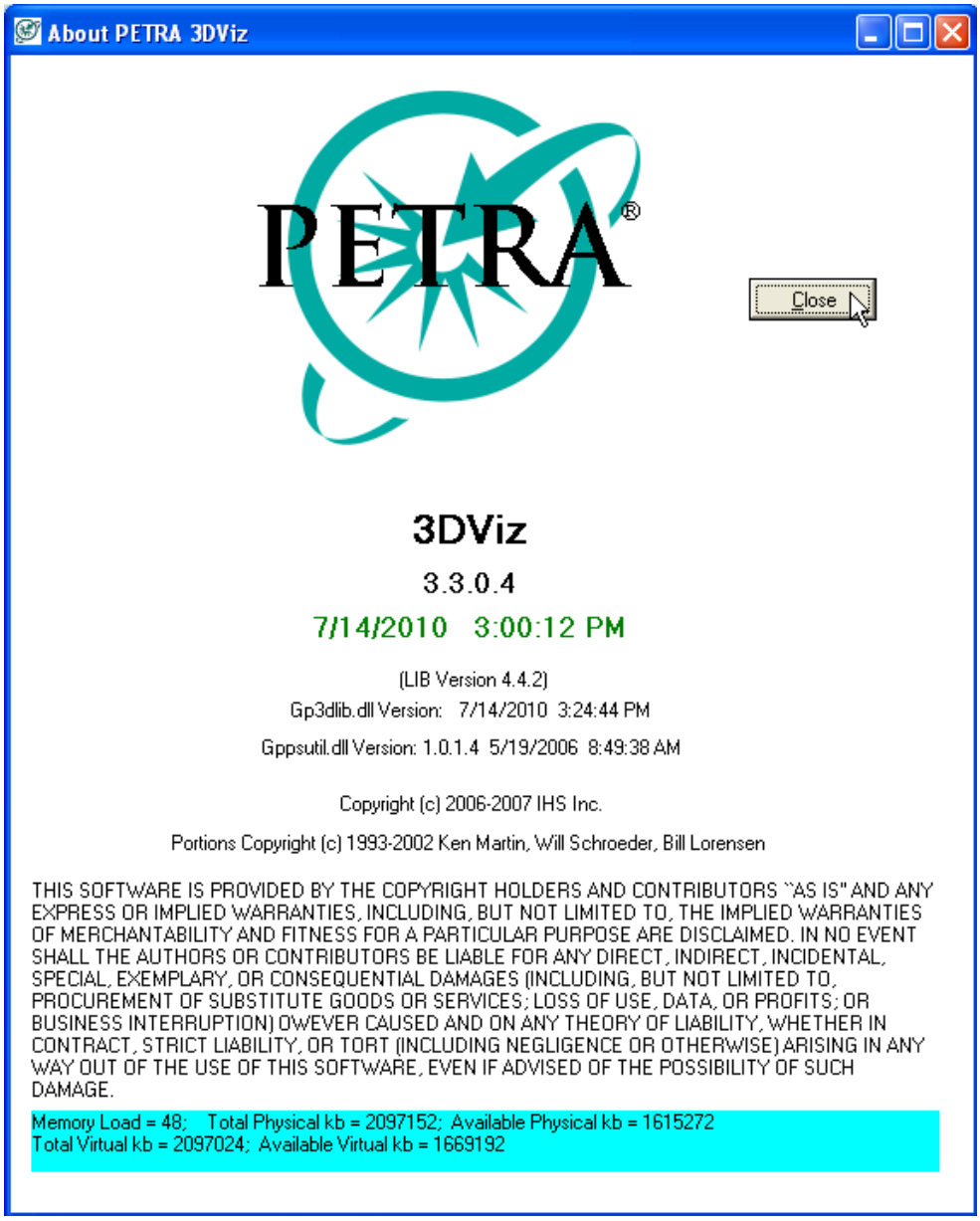
Prompts to the Main, Mapping, or Cross Section modules **if the modules are currently open**.

Note: The Main module can be accessed by double clicking on a well symbol.

Help Drop-down Menu



Note: To access current memory information, including Available Physical kb, select the **Help** drop-down menu, and then **About Petra 3DViz…** At the bottom of the window the information associated with the current memory is highlighted.


About PETRA 3DViz
PETRA®
Close
3DViz
3.3.0.4
7/14/2010 3:00:12 PM
(LIB Version 4.4.2)
Gp3dlib.dll Version: 7/14/2010 3:24:44 PM
Gppsutil.dll Version: 1.0.1.4 5/19/2006 8:49:38 AM
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Memory Load = 48; Total Physical kb = 2097152; Available Physical kb = 1615272
Total Virtual kb = 2097024; Available Virtual kb = 1669192

Hyperlinks to PETRA and PetraSeis

The following hyperlinks to PETRA and PetraSeis are located on the IHS Web site and include the most common files to be downloaded.

PETRA Online User Community

IHS and the PETRA team cordially invite you to participate in the PETRA Online User Community. We would like you use the PETRA Community Site to interact with us and with other PETRA community members in a new way.

Enter the following link: http://www.ihscommunity.com/energy/ into your internet browser and click the **go** button. If you have a PETRA license or work for a company that has a PETRA license, you can register as a PETRA SIG Member. You will then be able to post to the Forum and to see the Posts made by other PETRA SIG Members.

PETRA and PetraSeis Update links

https://petraftp.ihsenergy.com/Whatsnew.html – This link is used to view the latest changes for PETRA, The enhancements and bug fixes are listed by Version and Module.

www.ihs.com/permission/en/pps-downloads.aspx - PETRA Standalone and Network Download site. PetraSeis can be downloaded from this site as well.

PETRA Standalone version

Download the latest standalone version of PETRA –Contains all files for a complete install or update.

PETRA Network Version

Client (PC) Software – Contains the components that must reside on each PC that will execute PETRA. **Note:** It is not necessary to download and install the client.exe for existing workstations. Use for new installs.

Server Software – Contains the shared code that all PETRA users access over the network.

PetraSeis Download Pages

www.ihs.com/permission/en/pps-downloads.aspx Click on the link Download PetraSeis® to download the latest version of PetraSeis. The install file PSVer2.exe is used for the standalone install of PetraSeis as well as the Network install of PetraSeis.

Direct Link to PETRA and PetraSeis Update Files

https://petraftp.ihsenergy.com/alldisks.exe – This file is a complete install/update for PETRA. This file does not contain the bitlock drivers.

https://petraftp.ihsenergy.com/client.exe – Network Client Install.

Note: You do not have to download and install the new client.exe for existing installs of PETRA. Download and install for new client installs.

https://petraftp.ihsenergy.com/PSVer2.exe – PetraSeis Update file – This file is for the Standalone as well as the Network update/install.

https://petraftp.ihsenergy.com/server.exe – Used to Update/Install the Network Version of PETRA. This file contains all files and folders for an install or update.

Training site – Dates for US and Canadian training sessions:

http://www.ihs.com/products/oil-gas-information/training/petra.aspx – Click on the **Course Schedule** tab.

https://petraftp.ihsenergy.com/PETRA_OV_FOR_GEO_CLASS_OUTLINE.pdf **–** Outline for the Overview for Geoscientist training class.

https://petraftp.ihsenergy.com/PETRA_OV_FOR_ENG_CLASS_OUTLINE.pdf – Overview for Engineers class outline.

NEW! Online PETRA Training Now Available. – Enter the following link into your Internet Browser:

http://www.ihscommunity.com/energy/index.php?topic=2222.0 - Note that if you are not currently a member of the IHS Energy Community Forum, you can click the **Register** link to sign up. Please use your Name and Email address that we associate with your PETRA License.

This Online course provides an overview on the functionality of the IHS PETRA geological and engineering analysis tool.

Click a hyperlinked title listed on the page at this Web site to launch the associated course module. Don't forget to turn on your speakers or plug in your headphones.

Note: The playback bar across the bottom of each of the modules provides controls to pause, play, fast forward, rewind, and close. These modules use the Adobe Flash player. If you don't already have it installed, we've provided a link at the bottom of this page.

PETRA Utilities and Bitlock Drivers

https://petraftp.ihsenergy.com/cleanzone.exe – Utility to list the number of Tops or items in a zone. There is a Delete Items option to delete items or tops that are selected. When you click the **Tops** tab, click **Get Live Data Counts…** to see the number of live tops.

https://petraftp.ihsenergy.com/copyproj.exe – Utility used to copy and/or rename PETRA Projects.

https://petraftp.ihsenergy.com/curvature.pdf – Documentation on Curvature Attributes and their application to 3D interpreted horizons.

https://petraftp.ihsenergy.com/DBI_ODBC.EXE – ODBC Driver for PETRA – Data base is Read Only.

https://petraftp.ihsenergy.com/getvolumeinfo.exe – Returns information about the Hard Drive.

https://petraftp.ihsenergy.com/hasp.zip – Aladdin Bitlock Drivers – VISTA/Windows7 Compliant – Contains HDD32.exe (GUI Install program) and Hinstall.exe (Command Line install and un-install utility).

Note: Windows 7 has Native drivers that are installed when you plug in the USB bitlock. Normally you do not have to install the HDD32.exe as a driver for the Aladdin USB Bitlock. You must have install privileges in order for the driver to be installed.

https://petraftp.ihsenergy.com/inifix.exe – Utility used to edit Project Ini Files;

https://petraftp.ihsenergy.com/liccat.exe – Utility used to build a report and a DBIsam database that can be used for a batch import of raster LIC files.

https://petraftp.ihsenergy.com/petraborrow.exe – Utility for FlexLM license users to check out a license. This utility must be run from the network install folder. The default folder name is Petrasrv.

https://petraftp.ihsenergy.com/petrafiles.txt – This link lists the size and latest install dates on the WEB for the following files:

alldisks.exe, server.exe, PSVer2.exe, petramultienv.pdf, and client.exe. The links to these files can be found in the section "Direct Link to PETRA and PetraSeis Update Files".

https://petraftp.ihsenergy.com/petraflex.zip – Files for installing FlexLM on a Network includes installation instructions. The geoplus.exe daemon is included.

https://petraftp.ihsenergy.com/petraihs.exe – Files needed for Direct Connect – Enerdeq

https://petraftp.ihsenergy.com/petramultienv.pdf – PETRA Usage in Large Multiuser Environments Documentation file for IT Managers.

https://petraftp.ihsenergy.com/petraprojectreport.zip – Reporting Utility when using Work Groups.

https://petraftp.ihsenergy.com/petrascan.exe – Project data scan and report utility.

https://petraftp.ihsenergy.com/petrasync.exe – Utility to synchronize Petra Projects. A .PPF file is created.

https://petraftp.ihsenergy.com/PSV2Man.zip – PetraSeis Manual – Password protected – password petraplus

https://petraftp.ihsenergy.com/segyviewer.exe – PetraSeis Utility to view SEGY Seismic Data.

https://petraftp.ihsenergy.com/sysversion.exe – Returns version information for Windows including Service Pack.

https://petraftp.ihsenergy.com/well_symbol_meta_files.zip – This file contains all of the symbols available in PETRA in two formats: JPEG and EMF.

PETRA Middleware (Data Movers)

Middleware (Data Movers):

1. OpenSpirit
   http://www.openspirit.com/index
2. Innerlogix (Schlumberger)
   http://www.slb.com/content/services/software/im/innerlogix.asp
3. Petris Technologies
   http://www.petris.com/ProductsandServices.asp
4. Volant
   http://www.volantsolutions.com/index.htm

Applications:

1. Seisware (geophysics)
   http://www.seisware.com/?gclid=CMXth7yZjZ0CFdZM5QodWHfD7Q
2. BHL Boresight (geosteering)
   http://bhlboresight.com/
3. Petrosys (specialty mapping package)
   http://www.petrosys.com.au/
4. HDS (petrophysics)
   http://www.hds-log.com/
5. PST (petrophysics)
   http://www.pstware.com/solutions-overview.html
6. Powerlog (petrophysics – limited access)
   http://www.fugro-jason.com/software/powerbench/PowerLog.htm

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